United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
Cornell University
Agricultural Experiment
Station

Soil Survey of Sullivan County, New York

How To Use This Soil Survey

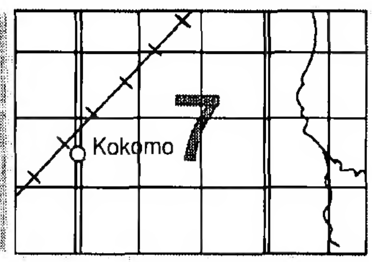
General Soil Map

The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

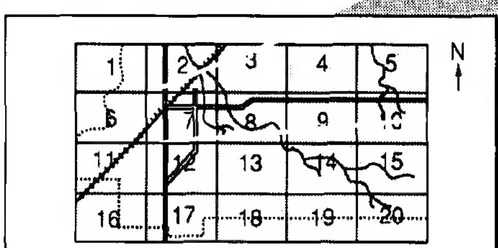
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.



MAP SHEET

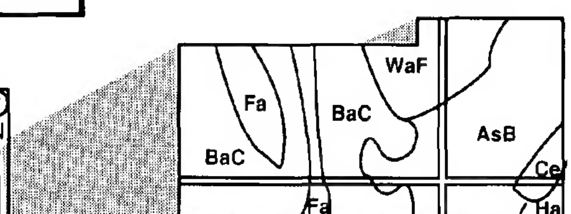
To find information about your area of interest, locate that area on the **Index to Map Sheets,** which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



INDEX TO MAP SHEETS

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.

MAP SHEET



AREA OF INTEREST

NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, handicap, or age.

Major fieldwork for this soil survey was completed in 1974-82. Soil names and descriptions were approved in 1983. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1984. This survey was made cooperatively by the Soil Conservation Service and the Cornell University Agricultural Experiment Station. It is part of the technical assistance furnished to the *Sullivan County Soil* and Water Conservation District. Partial funding for this survey was provided by the Sullivan County Soil and Water Conservation District and by the New York State Department of Agriculture and Markets.

This soil survey supersedes the soil survey of Sullivan County published in 1946 *(8)*.

Cover: The Wellsboro-Oquaga-Lackawanna general soil map unit near the Neversink Reservoir is used as both cropland and woodland. The Willowemoc-Mongaup-Lewbeach general soil map unit in the Catskill Mountains in the background is mainly forest and serves as a watershed for the New York City Reservoir system.

Contents

Issued July 1989

Index to Map Units

Summary of Tables

Foreword

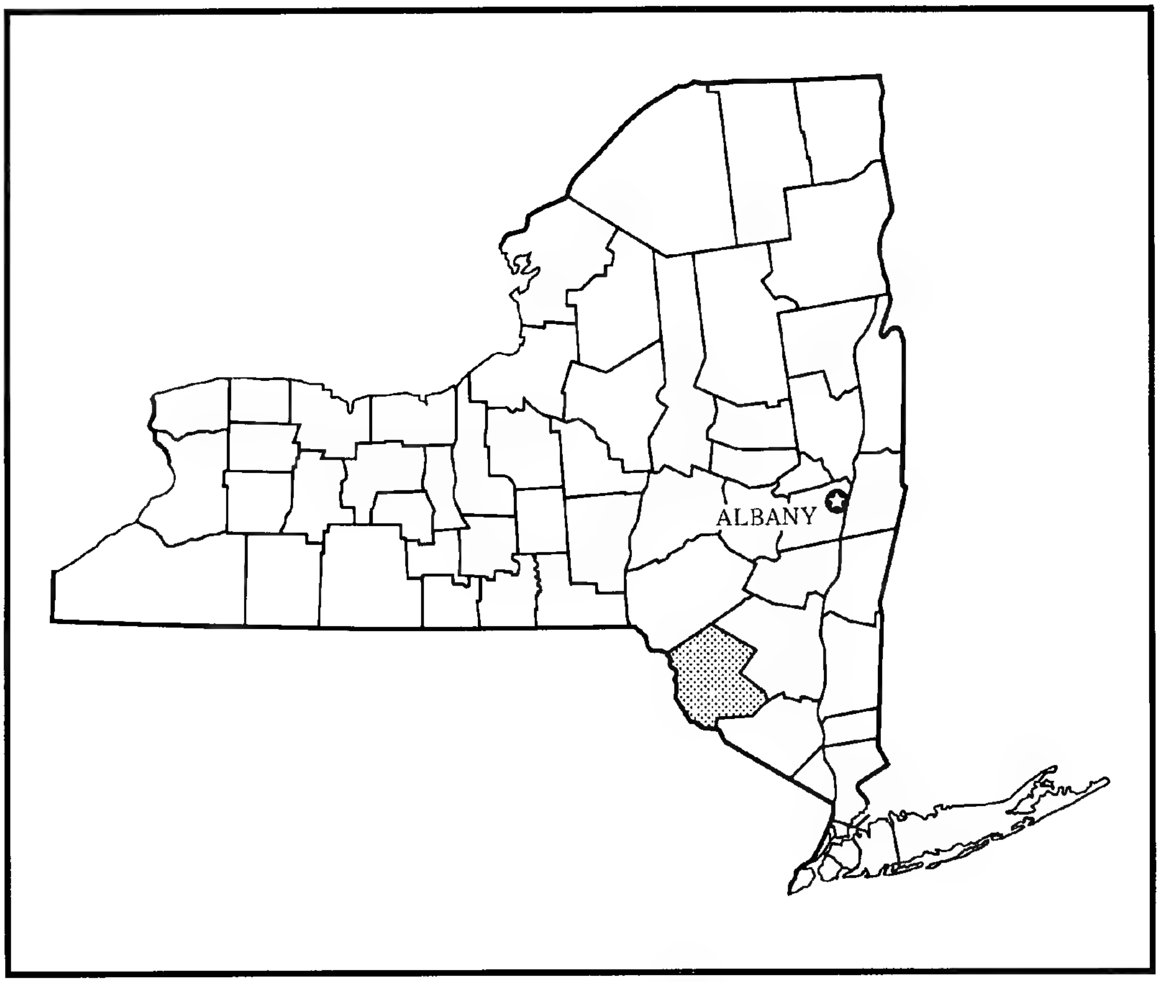
This soil survey contains information that can be used in land-planning programs in Sullivan County, New York. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Paul A. Dodd
State Conservationist
Soil Conservation Service



Location of Sullivan County in New York.

Soil Survey of
Sullivan County, New York

By Stefan T. Seifried, Soil Conservation Service

Fieldwork by Albert N. Averill, James H. Brown, Ronald R. Blackmore, Pred D. Holman, Kipen J. Kolesinkas, Robin A. Mangini, Gary C. Nightingale, Michael S. Ozark, Edward R. Stein, Martin van der Grintin, and Stefan T. Seifried, Soil Conservation Service

United States Department of Agriculture, Soil Conservation Service, in cooperation with Cornell University Agricultural Experiment Station

Sullivan County is in the southeast part of New York. The county, on its west and south sides, is separated from Pennsylvania by the Delaware River. The county borders Delaware County to the northwest, Ulster County to the northeast and east, and Orange County to the southeast and south. The total area of Sullivan County is 986 square miles, or 631,040 acres. Elevation ranges from less than 400 feet in the valley of the Shawangunk Kill along the eastern edge of the county to more than 3,000 feet in the Catskill Mountains in the north part of the county. Monticello, the county seat, is the largest village in the county.

Tourism is the most important industry in the county, and agriculture ranks second. Sullivan County produces more eggs than any other county in the state. More than 75 percent of Sullivan County is in both commercial and noncommercial forest land *(4)*. To an extent, logging and woodcutting for fuel take place throughout the county.

General Nature of the County

This section provides general information about the history and development, the physiography and geology, the drainage, the water supply, and the climate of the survey area.

History and Development

The first European to settle in Sullivan County was the Spaniard Don Manuel Gonzales. About 1700 he settled north of Wurtsboro in the valley called Mamakating Hollow. Other settlers were of Dutch and German descent *(5)*. A permanent settlement was established at Cochecton along the Delaware River in 1757. The Newburgh and Cochecton Turnpike, opened in 1808, and the Delaware and Hudson Canal, built in 1828, provided much needed systems of transportation for the county. The Erie Railroad started operating in 1848. Access to markets allowed rapid expansion of lumbering, tanning, and grist mill operations, all of which later declined. The population of the county reached 34,550 in 1870. Population growth nearly stopped after this early expansion, and in 1940 the population was 37,901.

As early industries declined, farming increased in importance. Agriculture consisted mainly of dairy and poultry farming and the growing of hay and grain crops needed in support of these operations. Farming peaked in the late 1800's in the county, and since then the number of farms and of people engaged in farming has steadily decreased. In 1900 the number of farms was 3,887 and just over 74 percent of the county land was farmland. In 1978 there were 476 farms and about 12 percent of the land was in farms *(12)*.

The summer resort industry was developed during the latter part of the 1800's, when special trains began running between Sullivan County and New York City. Tourist hotels constitute the main nonagricultural

business in the county. These hotels, along with various bungalow colonies and children's camps, in summer are economically important.

Physiography and Geology

Bernard S. Ellis, senior staff geologist, Soil Conservation Service, assisted in preparing this section

Sullivan County lies mainly within the Appalachian Plateaus province, which is divided into several sections. The northern one-third of the county consists of the Catskill section. The largest part of the county is the Southern New York section just south of the Catskill Mountains. This part is a deeply dissected plateau that slopes gently to the southwest. The southeast edge of this plateau is bounded by a fairly steep, prominent escarpment, which is observable when traveling west on Route 17 near Wurtsboro. A small part of southeastern Sullivan County lies in the Ridge and Valley province. The most prominent features of this province are the Port Jervis Trough, the Shawangunk Mountains, and the Wallkill Valley *(3)*.

The highest elevations in the county are in the Catskill section and include Denman Mountain at 3,051 feet and unnamed mountaintops near Hodge Pond at elevations of 2,985 feet and 3,118 feet. Relief in this area is commonly quite steep. South of the Catskill Mountains, in the Southern New York section, elevations range from about 2,000 feet in the north part to about 1,200 feet in the south part. The lowest elevation in this section, about 480 feet, is at the junction of the Mongaup and Delaware Rivers at the south boundary of the county. Relief is generally steeper in the west part of this section and less steep in the central and south areas except for valley sides of the Delaware River and the lower Neversink River. In the Ridge and Valley section, elevations of the prominent Shawangunk Mountains range from about 1,780 feet at their north end to about 1,200 feet at their south end. The lowest point in this section, about 380 feet, is at the junction of the Platte Kill and Shawangunk Kill at the east boundary of the county. Relief is steepest on the sides of the Shawangunk Ridge. Vantage points such as the old fire tower at Roosa Gap offer spectacular views of Sullivan and Orange Counties.

Bedrock underlying all physiographic areas of Sullivan County is of sedimentary origin (fig. 1). The bedrock formations are oldest at the southeast edge of the county next to Orange County and become progressively younger in a northwesterly direction toward Delaware County. Dark shale bedrock of Ordovician age is at the southeast edge of the county. These rocks belong to the Trenton Group, of which the Snake Hill Shale Formation is the principal member. The Shawangunk Mountains consist of extremely resistant conglomerate rock that forms strikingly prominent ridges and cliffs in this area. Devonian roads just west of the Shawangunk rocks include shale and limestone of the Schoharie and Glenerie formations. A small area of exposed limestone occurs on the east side of Basher Kill, just north of the Orange County line. Middle and upper Devonian age rocks are farther west and continue across the rest of Sullivan County. These rocks are mainly red and grayish brown sandstone and shale and include the Stony Clove and Katsburg Formations and the undifferentiated Hamilton Group.

Sullivan County was completely glaciated during the last ice age. This was the Wisconsinan Glaciation, which ended about 10,000 years ago. It markedly affected the surface features of the county. Much of the county is covered by glacial till, an unsorted mixture of sand, silt, clay, and rock fragments. Depth of this material in the county ranges from just a few inches on hilltops to several hundred feet in some valleys. Swartswood, Lackawanna, and Wellsboro soils are examples of soils that formed in glacial till.

Other common glacial deposits include glacial outwash, which is coarse sandy and gravelly material deposited by meltwater flowing from the glacier. These deposits occur as outwash plains or as small rounded hills, ridges, or terraces along valley sides. Tunkhannock, Chenango, and Red Hook soils are examples of soils that formed in glacial outwash.

The fine sand, silt, and clay particles in glacial meltwater settled out in lakes or ponds. These lacustrine deposits occur in several parts of the county but are most extensive in the valleys of the Shawangunk and Basher Kills. Scio, Raynham, and Wallington soils formed in these deposits.

The glaciation of Sullivan County also resulted in many small shallow lakes that gradually filled with partly decomposed plant material. The remnants of these glacial lakes, now filled with peat or muck, are scattered throughout the county. Carlisle and Palms soils formed in these deposits.

Drainage

Most of Sullivan County is drained by the Delaware River or its tributaries. A small area in the east part of the county flows into the Hudson River drainage system.

The Beaver Kill and Willowemoc Creek drain the

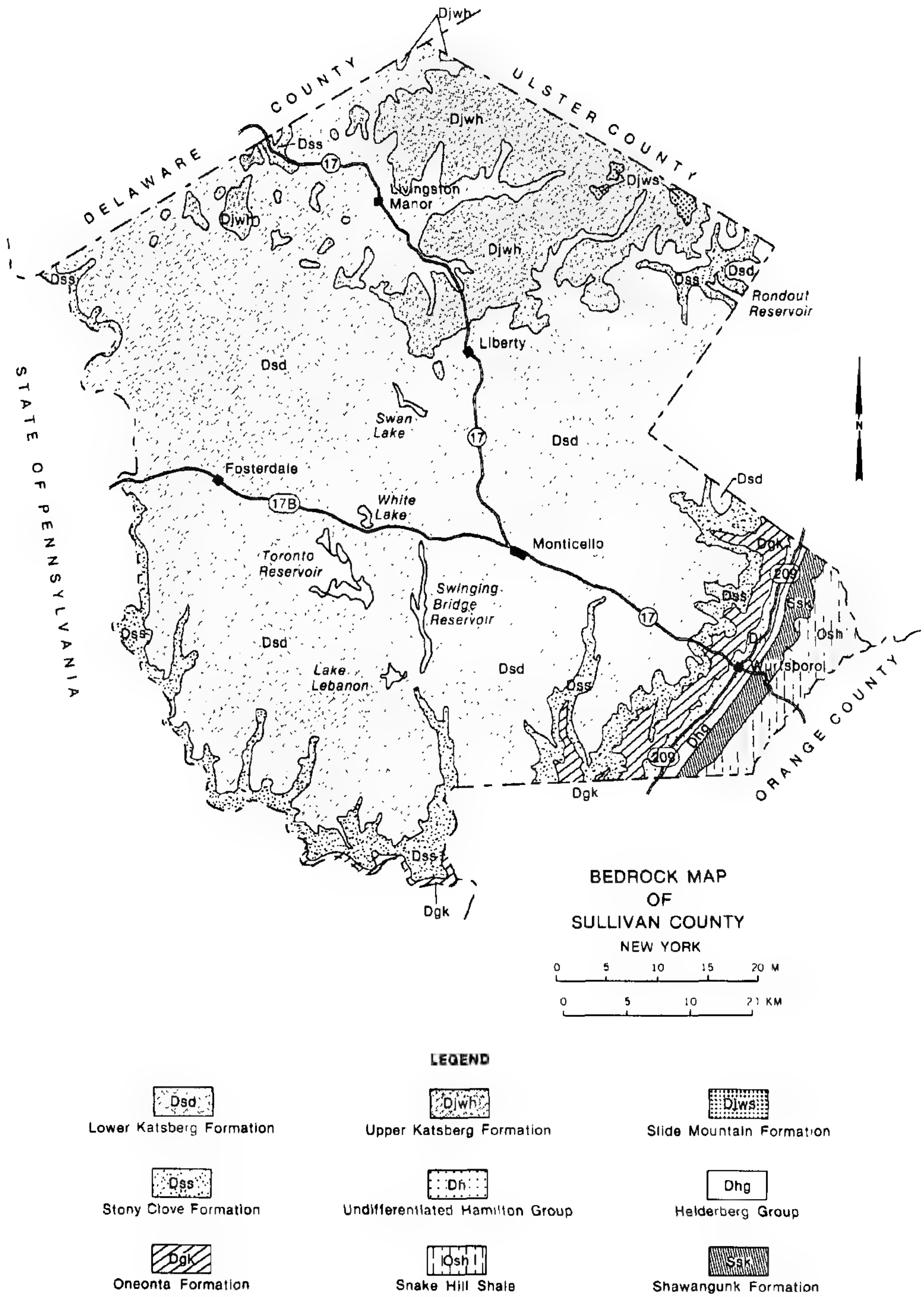


Figure 1.—Bedrock geology map of Sullivan County.

northwest part of the county, flowing westward into Delaware County and eventually into the East Branch of the Delaware River.

Streams draining the west and south parts of Sullivan County include Hankins Creek, Callicoon Creek, and Ten Mile River. The Mongaup River drains a large part of the central and south parts of Sullivan County. The Neversink River flows from Ulster County into the northeast part of Sullivan County, continues southward through the towns of Fallsburg, Thompson, and Forestburg, and then flows into Orange County. The Basher Kill drains much of the town of Mamakating in the east part of the county. The Shawangunk Kill, Homowack Kill, and Rondout Creek drain some extreme east parts of the county and eventually flow into the Hudson River.

Generally, the streams in Sullivan County have cut deeply into the landscape and have steep valley sides and relatively narrow flood plains. The valley of the Neversink River is wider in some areas, especially in the town of Fallsburg. The Basher Kill Valley is about 1 mile wide at Haven, south of Wurtsboro.

Water Supply

The main source of water in Sullivan County is ground water *(6)*. Ground water is drawn from three kinds of aquifers: bedrock, glacial till, and glacial outwash. The glacial outwash yields the greatest amount of water and provides several public water supplies. The bedrock aquifer is the most commonly used and widely available source of water. Fractures in the rock hold ground water. This kind of aquifer can supply small or moderate amounts of water. Glacial till is generally not a reliable source of water because its yields are low.

Surface water from lakes or reservoirs supplies water for several of the larger communities in the county. Springs supply water in small amounts.

Climate

Prepared by the National Climatic Data Center, Asheville, North Carolina.

Winters are cold in Sullivan County. Valley areas in the south and east parts of the county are somewhat warmer than in the Liberty areas, and upper slopes and mountaintops are somewhat colder. In summer, valleys are very warm and frequently hot. Mountains are warm during the day and become cool at night. Precipitation is generally heavy and evenly distributed throughout the year. In summer, it falls chiefly during thunderstorms. In winter, precipitation in the valleys is rain or snow. In the mountains it is mainly snow although rain is common. Snow cover may be prolonged, especially at higher elevations. Heavy rains from prolonged storms, at any time of the year, occasionally cover the entire area and cause severe flooding in the valleys.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Liberty in the period 1951 to 1980. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 23 degrees F, and the average daily minimum temperature is 14 degrees. The lowest temperature on record, which occurred at Liberty on February 9, 1963, is -26 degrees. In summer the average temperature is 65 degrees, and the average daily maximum temperature is 76 degrees. The highest recorded temperature, which occurred at Liberty on September 3, 1953, is 99 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 52 inches. Of this, 26 inches, or 50 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 21 inches. The heaviest 1-day rainfall during the period of record was 5.03 inches at Liberty on August 19, 1955. Thunderstorms occur on about 31 days each year, and most occur in summer.

The average seasonal snowfall is 83 inches. The greatest snow depth at any one time during the period of record was 48 inches. On the average, 58 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 60 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 60 percent of the time possible in summer and 35 percent in winter. The prevailing wind is from the west-southwest. Average windspeed is highest, 11 miles per hour, in winter.

How This Survey Was Made

Soil scientists made this survey to learn what soils are in the survey area, where they are, and how they can be used. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; and the kinds of rock. They dug many holes to study soil profiles. A profile is the sequence of natural layers, or horizons, in the soil. It extends from the surface down into the parent material, which has been changed very little by leaching or by plant roots.

The soil scientists recorded the characteristics of the profiles they studied and compared those profiles with others in nearby counties and in more distant places. They classified and named the soils according to nationwide uniform procedures. They drew the boundaries of the soils on aerial photographs. These photographs show trees, buildings, fields, roads, and other details that help in drawing boundaries accurately. The soil maps at the back of this publication were prepared from aerial photographs.

The areas shown on a soil map are called map units. Most map units are made up of one kind of soil. Some are made up of two or more kinds. The map units in this survey area are described under "General Soil Map Units" and "Detailed Soil Map Units."

While a soil survey is in progress, samples of some soils are taken for laboratory measurements and for engineering tests. All soils are field tested to determine their characteristics. Interpretations of those characteristics may be modified during the survey. Data are assembled from other sources, such as test results, records, field experience, and state and local specialists. For example, data on crop yields under defined management are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it can be used by farmers, rangeland and woodland managers, engineers, planners, developers and builders, home buyers, and others.

This soil survey supersedes the soil survey of Sullivan County published in 1946 *(8)*. This survey provides additional information and contains larger maps that show the soils in greater detail.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The general soil map units of Sullivan County join with similar map units in Ulster and Orange Counties. These units do not join exactly, however, because the soils and the soil map legends in these adjacent counties are somewhat different. The general soil map units, which cover broad areas and are named for the dominant soils in those areas, do not match other map units along county boundaries.

Pike and Wayne Counties in Pennsylvania are also adjacent to Sullivan County. The general soil map units of these counties do not join directly with those in Sullivan County because the Delaware River forms a natural boundary between the two survey areas. Many of the same soils are in the two survey areas, but the proportions of major soils differ from one survey area to the other; consequently, the names of general soil map units are different.

Sullivan County joins Delaware County to the northwest. There is no modern soil map for Delaware County.

Soil Descriptions

1. Willowemoc-Mongaup-Lewbeach

Nearly level to very steep, moderately deep and very deep, moderately well drained and well drained, medium textured soils; on uplands in the area of the Catskill Mountains

These soils formed in glacial till that is dominantly sandstone and partly siltstone and shale. The landscape has been deeply cut by streams. It consists of steep hillsides and gently sloping or rolling hilltops and ridges. Convex ridges are influenced by underlying bedrock, and steeper areas commonly have the appearance of stairsteps. Slope ranges from 0 to about 50 percent. It is dominantly 3 to 15 percent on hilltops but ranges to 50 percent or more on hillsides and narrow valley walls.

This map unit makes up about 16 percent of the county. It is about 40 percent Willowemoc soils, about 20 percent Mongaup soils, about 15 percent Lewbeach soils, and about 25 percent soils of minor extent (fig. 2).

Willowemoc soils formed in glacial till derived from reddish sandstone, siltstone, and shale. These soils are nearly level to strongly sloping and are on upland plateaus and hillsides. They are very deep and moderately well drained. A dense, firm layer called a fragipan is at a depth of about 24 inches. Permeability is moderate in the surface layer and in the upper part of the subsoil and slow or very slow in the fragipan.

Mongaup soils formed in glacial till derived from reddish sandstone, siltstone, and shale. These soils are nearly level to steep and are on hilltops and hillsides on bedrock-controlled uplands. They are moderately deep and moderately well drained and well drained. Hard sandstone bedrock is at a depth of about 24 inches. Permeability is moderate in the surface layer and the subsoil.

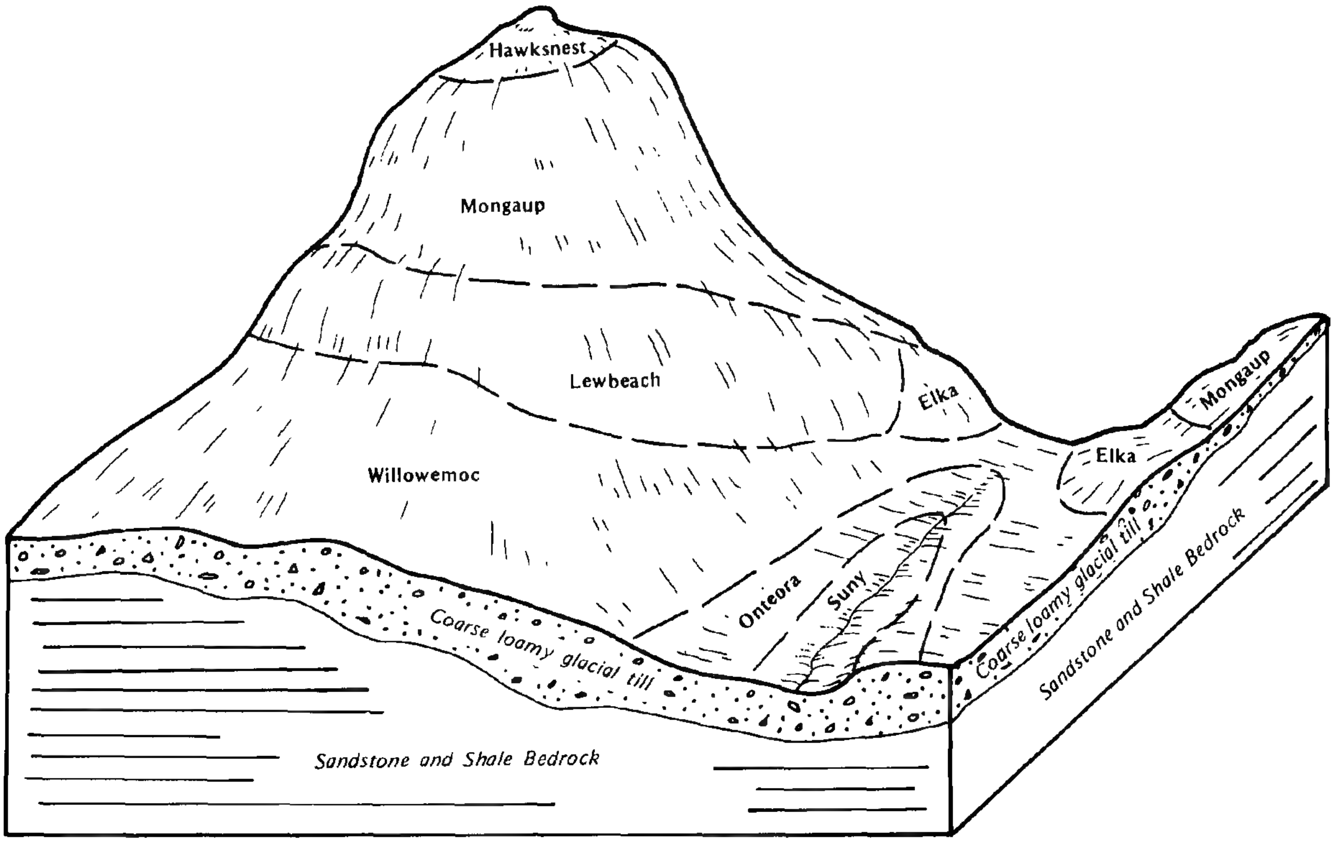


Figure 2.—Typical landscape pattern of the soils and the underlying material in the Willowemoc-Mongaup-Lewbeach general soil map unit.

Lewbeach soils formed in glacial till derived from reddish sandstone, siltstone, and shale. These soils are gently sloping to very steep and are on hilltops and hillsides on uplands. They are very deep and well drained. A dense, firm fragipan is at a depth of about 30 inches. Permeability is moderate above the fragipan and slow in the fragipan.

Soils of minor extent are Hawksnest, Elka, Onteora, Suny, Ossipee, and Greenwood soils. Hawksnest soils are shallow and somewhat excessively drained and well drained and are on hilltops and hillsides. Elka soils are very deep and well drained and dominantly are on hillsides. Somewhat poorly drained Onteora soils and poorly drained and very poorly drained Suny soils are on the lower parts of hillsides and in upland depressions. Ossipee and Greenwood soils are very poorly drained, organic soils in depressions. Some valley floors have strips of well drained Barbour soils or well drained or somewhat excessively drained Tunkhannock soils.

Most of the acreage in this map unit is wooded, and provides habitat for wildlife or is in recreation use (fig. 3). Some areas, particularly in the valleys, have been cleared and are used for hay and pasture. The main limitations of these soils for farming and for urban development are the seasonal high water table, slow or very slow permeability in the lower part of the subsoil, depth to bedrock, stoniness, and slope.

2. Wellsboro-Oquaga-Lackawanna

Nearly level to very steep, very deep and moderately deep, moderately well drained to excessively drained, medium textured soils; on uplands

These soils formed in glacial till that is dominantly reddish shale and sandstone. The landscape is rolling uplands including gently sloping hilltops and foot slopes and steeper hillsides. Slope is mainly 3 to 15 percent on hilltops and foot slopes and is steeper on hillsides. Slope ranges from 0 to 50 percent.

Figure 3.—Typical landscape in the Willowemoc-Mongaup-Lewbeach general soil map unit. In the foreground Willowemoc soils that were once farmed have been abandoned and are reverting to brush and trees. In the background Mongaup and Lewbeach soils are mainly used for recreation and timber production.

This map unit makes up about 33 percent of the county. It is about 40 percent Wellsboro soils, 15 percent Oquaga soils, 10 percent Lackawanna soils, and 35 percent soils of minor extent (fig. 4).

Wellsboro soils formed in glacial till derived from reddish sandstone and shale. These soils are nearly level to strongly sloping and on plateaus and hillsides on uplands. They are very deep and moderately well drained. A dense, firm layer called a fragipan is at a depth of about 24 inches. Permeability is moderate in the surface layer and in the subsoil above the fragipan and slow in the fragipan.

Oquaga soils formed in glacial till derived from reddish shale and sandstone. These soils are nearly

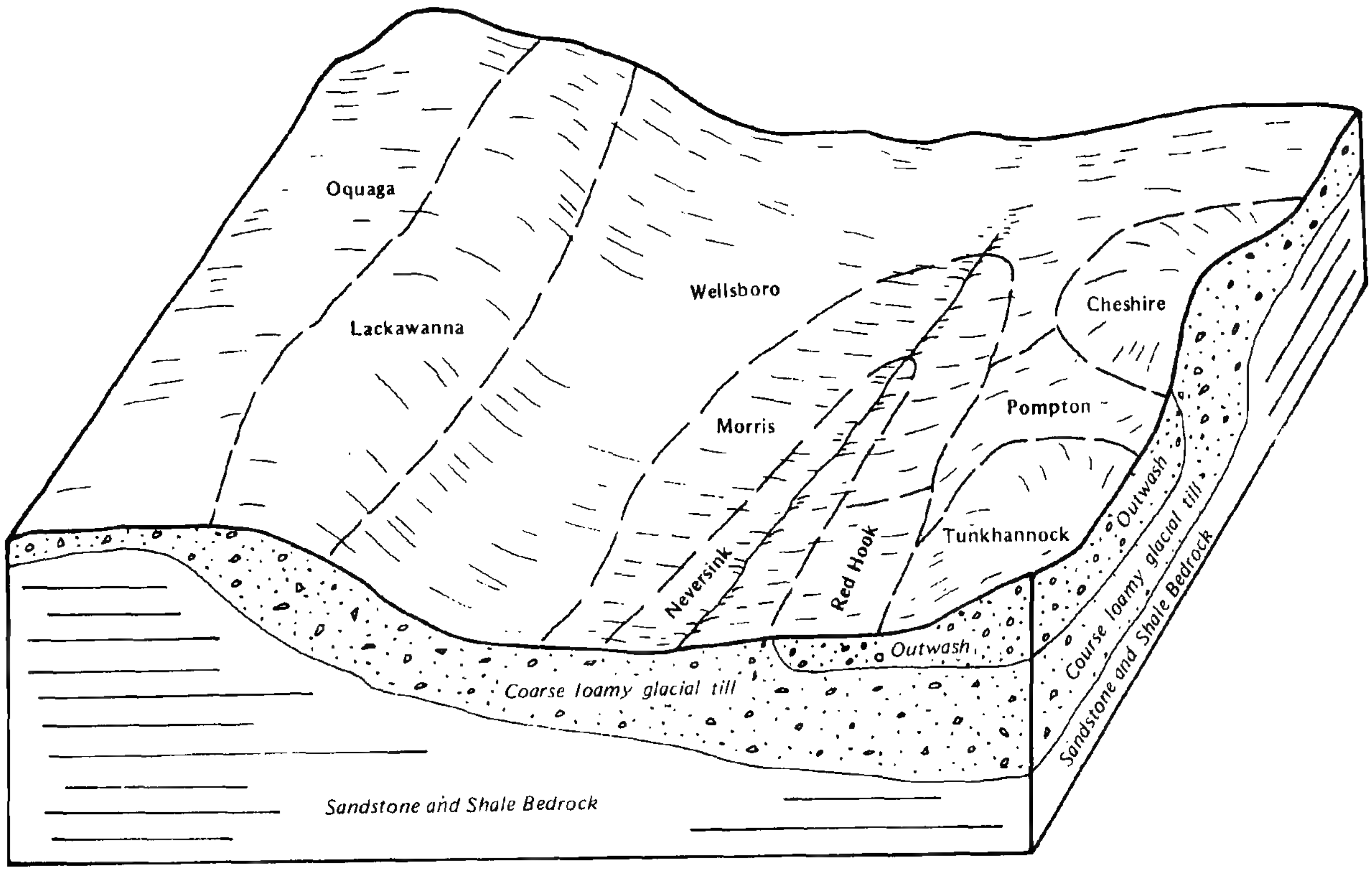


Figure 4.—Typical landscape pattern of the soils and the underlying material in the Wellsboro-Oquaga-Lackawanna general soil map unit.

level to steep and on hilltops and hillsides on uplands. They are moderately deep and well drained to excessively drained. Reddish shale bedrock is at a depth of about 36 inches. Permeability is moderate in the surface layer and the subsoil.

Lackawanna soils formed in glacial till derived from reddish sandstone and shale. These soils are nearly level to very steep and on hilltops and hillsides on uplands. They are very deep and well drained. A dense, firm layer called a fragipan is at a depth of about 30 inches. Permeability is moderate above the fragipan and slow in the fragipan.

Soils of minor extent are the mostly well drained Arnot and Tunkhannock soils, well drained Cheshire and Barbour soils, somewhat poorly drained Morris soils, poorly drained or very poorly drained Neversink soils, and very poorly drained Alden, Palms, and Carlisle soils. Arnot soils are shallow and generally near Oquaga soils on hilltops and hillsides. Cheshire, Tunkhannock, and Barbour soils are very deep and along valley sides and along streams on valley floors. Morris soils are on the lower parts of hillsides on uplands. Neversink, Alden, Carlisle, and Palms soils are in depressions or along small drainageways.

Many areas of this map unit have been cleared and are used for cultivated crops, hay, and pasture (fig. 5). Some areas are used for community development. A large acreage in the map unit, especially many of the steeper or more shallow areas, is forested. Nearly level and gently sloping areas of the unit are well suited to farming. In most areas slope is a limitation. Other limitations include the seasonal high water table, depth to bedrock, and slow permeability in the subsoil.

3. Wellsboro-Wurtsboro-Morris

Nearly level to strongly sloping, very deep, moderately well drained and somewhat poorly drained, medium textured, extremely stony, stony, and nonstony soils; on uplands

Figure 5.—A pastured area in the Wellsboro-Oquaga-Lackawanna general soil map unit used mainly for dairy farming. In the background the soils on the higher hilltops are mainly in the Arnot-Lordstown general soil map unit and are commonly used as pasture or woodland.

These soils formed in glacial till that has a high content of shale and sandstone fragments. The landscape is rolling uplands including gently sloping hilltops and foot slopes and steeper hillsides. Most areas are extremely stony, and other areas are stony or bouldery. Stones or boulders are generally 2½ to 5 feet apart. Slope is mainly 3 to 15 percent on hilltops, foot slopes, and hillsides. Slope ranges from 0 to about 15 percent.

This map unit makes up about 12 percent of the county. It is about 25 percent Wellsboro soils, 25 percent Wurtsboro soils, 15 percent Morris soils, and 35 percent soils of minor extent.

Wellsboro soils formed in glacial till derived from reddish sandstone and shale. These soils are nearly level to strongly sloping and on plateaus and hillsides on uplands. They are very deep and moderately well drained. A dense, firm layer called a fragipan is at a

depth of about 24 inches. Permeability is moderate in the surface layer and in the subsoil above the fragipan and slow in the fragipan.

Wurtsboro soils formed in glacial till derived from sandstone, conglomerate, and shale. These soils are nearly level to strongly sloping and on plateaus and hillsides on uplands. They are very deep and moderately well drained. A dense, firm layer called a fragipan is at a depth of about 24 inches. Permeability is moderate in the surface layer and in the subsoil above the fragipan and slow in the fragipan.

Morris soils formed in glacial till derived from reddish sandstone and shale. These soils are nearly level to strongly sloping and on hilltops and the lower parts of hillsides on uplands. They are very deep and somewhat poorly drained. A dense, firm layer called a fragipan is at a depth of about 18 inches. Permeability is moderate in the surface layer and in the subsoil above the fragipan and slow or very slow in the fragipan.

Soils of minor extent are well drained Swartswood, Lackawanna, and Valois soils, dominantly on steeper hillsides. The mostly well drained, shallow Arnot soils and moderately deep Lordstown soils are on hilltops and steeper hillsides. Somewhat poorly drained Scriba soils are on lower parts of hillsides and along small drainageways. Poorly drained or very poorly drained Neversink soils and very poorly drained Alden, Carlisle, and Palms soils are in depressions and along small drainageways.

Most areas of this unit are woodland. A few small areas have been cleared and are used for hay and pasture. Other small cleared areas are used as building sites. In stony or bouldery areas cultivation is difficult or impossible. The limitations of these soils for urban development are the seasonal high water table, surface stoniness, slow permeability in the subsoil, and slope. Many areas can be used as habitat for wildlife or for recreation.

4. Wurtsboro-Swartswood

Nearly level to steep, very deep, moderately well drained and well drained, medium textured soils; on uplands

These soils formed in glacial till dominated by gray or brown sandstone, quartzite, or conglomerate. The landscape is rolling uplands including gently sloping hilltops and foot slopes and steeper hillsides. Stones are about 10 to 200 feet apart on the surface. Slope is mainly 3 to 15 percent on hilltops and foot slopes and is more than 15 percent on hillsides. Slope ranges from 0 to about 35 percent.

This map unit makes up about 16 percent of the county. It is about 40 percent Wurtsboro soils, 25 percent Swartswood soils, and 35 percent soils of minor extent.

Wurtsboro soils formed in glacial till derived from sandstone, conglomerate, and shale. These soils are nearly level to strongly sloping and on plateaus and hillsides on uplands. They are very deep and moderately well drained. A dense, firm layer called a fragipan is at a depth of about 24 inches. The seasonal high water table is perched above the fragipan from late fall to early spring. Permeability is moderate in the surface layer and in the subsoil above the fragipan and slow in the fragipan.

Swartswood soils formed in glacial till derived from sandstone, conglomerate, and shale. These soils are gently sloping to steep and on hilltops and hillsides on uplands. They are very deep and well drained. A dense, firm layer called a fragipan is at a depth of about 24 inches. The seasonal high water table is perched above the fragipan in winter and early spring. Permeability is moderate in the surface layer and in the subsoil above the fragipan and slow or moderately slow in the fragipan.

Soils of minor extent are the mostly well drained, shallow Arnot soils and moderately deep Lordstown soils on hilltops and hillsides. Well drained Valois soils are on steeper hillsides and at the edges of valleys. Somewhat poorly drained Scriba soils are on the lower parts of hillsides and along small drainageways. Poorly drained or very poorly drained Neversink soils and very poorly drained Alden, Carlisle, and Palms soils are in depressions or along drainageways in the lower parts of the landscape.

Some gently sloping areas of this map unit have been cleared and are used for hay and pasture. Other areas are idle and have a cover of brush or nonwoody plants. Most areas, especially on steeper slopes, are forested. Streams, with steep banks and narrow, steepsided valleys, are common in this unit. The main limitations of these soils for agriculture and urban development are the seasonal high water table, steep slopes, stones, and slow permeability.

5. Arnot-Lordstown

Nearly level to very steep, shallow and moderately deep, somewhat excessively drained to well drained, medium textured soils; on uplands

These soils formed in glacial till that has a high content of sandstone, shale, and siltstone fragments. The landscape consists of gently sloping upland plateaus and ridgetops and steeper escarpments and

ridge sides. Stones and rock outcrops are common in areas of the major soils. Slope ranges from 0 to about 70 percent.

This map unit makes up about 15 percent of the county. It is about 50 percent Arnot soils, 20 percent Lordstown soils, and 30 percent soils of minor extent.

Arnot soils formed in glacial till derived from sandstone, siltstone, shale, or conglomerate. These soils are nearly level to very steep and on hilltops and hillsides in bedrock-controlled uplands. They are shallow and somewhat excessively drained to moderately well drained. Hard sandstone bedrock is commonly at a depth of about 18 inches. Permeability is moderate in the surface layer and the subsoil.

Lordstown soils formed in glacial till derived from sandstone, siltstone, shale, or conglomerate. These soils are nearly level to steep and on hilltops and hillsides in bedrock-controlled uplands. They are moderately deep and well drained. Hard, sandstone bedrock is at a depth of about 24 inches. Permeability is moderate in the surface layer and the subsoil.

Soils of minor extent are very deep, well drained Valois and Swartswood soils and moderately well drained Wurtsboro soils on hillsides or at the edges of valleys. Very deep, somewhat poorly drained Scriba soils are on the lower parts of hillsides and along small drainageways. Poorly drained or very poorly drained Neversink soils and very poorly drained Alden soils are in depressions and along small drainageways in the lowest parts of the landscape.

Most areas of this map unit are woodland and provide habitat for wildlife or are in recreation use. The limitations of these soils for agriculture and urban development are depth to bedrock, stones, rock outcrops, and steep slopes.

6. Valois-Chenango-Riverhead

Nearly level to very steep, very deep, well drained and somewhat excessively drained, moderately coarse textured and medium textured soils; in valleys

These soils formed in glacial till that has sandy and gravelly deposits of glacial outwash. The landscape ranges from nearly level valley floors to hilly or sloping valley or terrace sides. Slope is nearly level and gently sloping in the valley bottoms or outwash plains and strongly sloping to very steep on valley and terrace sides. Slope ranges from 0 to about 50 percent.

This map unit makes up about 4 percent of the county. It is about 45 percent Valois soils, 25 percent Chenango soils, 10 percent Riverhead soils, and 20 percent soils of minor extent.

Valois soils formed in the glacial till derived from sandstone, siltstone, and shale. These soils are gently sloping to very steep and along valleys sides. They are very deep and well drained. The surface layer is moderately coarse textured. Permeability is moderate in the surface layer and in the upper part of the subsoil and moderate or moderately rapid in the lower part.

Chenango soils formed in deposits of sandy and gravelly glacial outwash. These soils are nearly level to moderately steep and on valley floors and along valley sides. They are very deep and are somewhat excessively drained and well drained. The surface layer is medium textured. Permeability is moderate or moderately rapid in the surface layer and in the subsoil and rapid in the substratum.

Riverhead soils formed in sandy and gravelly glacial outwash. These soils are nearly level to strongly sloping and on valley floors and along valley sides. They are very deep and well drained. The surface layer is moderately coarse textured. Permeability is moderate or moderately rapid in the surface layer and in the subsoil and rapid in the substratum.

Soils of minor extent are well drained Swartswood soils and moderately well drained Wurtsboro and Mardin soils on hillsides. All these soils have a dense, firm subsoil. Other minor soils are excessively drained Otisville soils, moderately well drained Pompton soils, and somewhat poorly drained Red Hook soils on valley floors or along valley sides. Medium textured, moderately well drained Scio soils and somewhat poorly drained or poorly drained Raynham soils are on broad, nearly level or gently sloping valley floors.

Some of the nearly level to strongly sloping areas of soils in this map unit are used for cultivated crops, hay, or pasture. Other areas are idle and have a cover of brush or nonwoody plants. Most of the acreage, especially the steeper areas, is forested. Nearly level and gently sloping areas of soils in this map unit are well suited to agriculture and urban development. Sand and gravel pits, both active and inactive, are common on the major soils. Slope, in the steeper areas, is the main limitation of these soils for urban development and agriculture.

7. Cheshire-Tunkhannock

Nearly level to very steep, very deep, well drained and somewhat excessively drained, medium textured soils; in valleys and on valley sides

These soils formed in glacial till and glacial outwash derived from reddish sandstone and shale. The landscape includes nearly level valley floors and

terraces, undulating and rolling areas along the edges of valleys, and steep or very steep valley sides. Slope ranges from 0 to about 60 percent.

This map unit makes up about 4 percent of the county. It is about 50 percent Cheshire soils, 25 percent Tunkhannock soils, and 25 percent soils of minor extent.

Cheshire soils formed in glacial till derived from reddish sandstone and shale. These soils are gently sloping to very steep and at the edges of valleys and on valley sides. They are very deep and well drained. Permeability is moderate or moderately rapid in the surface layer and the subsoil.

Tunkhannock soils formed in glacial outwash derived from reddish sandstone and shale. These soils are nearly level to very steep and on terraces and the edges of valleys. They are very deep and are well drained and somewhat excessively drained. Permeability is moderate or moderately rapid. In some years these soils are droughty in summer.

Soils of minor extent are well drained Lackawanna soils and moderately well drained Wellsboro soils on valley sides. Both soils have a fragipan. Other minor soils on terraces and valley sides are well drained Riverhead soils and moderately well drained and somewhat poorly drained Pompton soils. Riverhead soils are sandier than the major soils in this map unit. Well drained Barbour soils are along streams and on broad terraces. Bash and Wayland soils and Udifluvents and Fluvaquents are wetter, minor soils that also are along streams.

Some areas of the soils in this unit have been cleared and are used for cultivated crops, hay, and pasture. Other areas are forest or are used for urban development. Nearly level or gently sloping areas of Cheshire and Tunkhannock soils are well suited to farming or urban development. Tunkhannock soils are a good source of gravel. In strongly sloping to very steep areas Cheshire and Tunkhannock soils are limited for use for agriculture and urban development. On some included minor soils, flooding is a limitation, especially for urban development.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Scriba loam, 0 to 3 percent slopes, stony, is one of several phases in the Scriba series.

Some map units are made up of two or more major soils. These map units are called soil complexes, soil associations, or undifferentiated groups.

A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Oquaga-Arnot complex, 8 to 15 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in the mapped areas are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Neversink and Alden soils, very stony, is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Pits, gravel, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

Ad—Alden silt loam. This is a very deep, nearly level, very poorly drained soil on smooth, flat, or slightly depressed parts of glacial till plains. Areas of the soil are irregular in shape and range from 3 to 30 acres in size. Slope ranges from 0 to 3 percent.

Typically, the surface layer is black silt loam about 12

inches thick. The subsoil is firm, mottled, gray silt loam to a depth of 33 inches. The substratum extends to a depth of 60 inches or more. In the upper part it is firm, mottled, brown channery silt loam about 9 inches thick. In the lower part it is friable, mottled, reddish gray gravelly silt loam.

Included with this soil in mapping are areas of slightly better drained Scriba and Morris soils on higher parts of the landscape. Also included are Palms soils, which have a thick, black, organic surface layer and are in depressions. Also included are areas of sandy Neversink soils and areas of very stony or bouldery soils. The included soils range to 3 acres in size and make up about 20 percent of the map unit.

Permeability of this Alden soil is moderate in the surface layer, moderately slow in the subsoil, and slow or moderately slow in the substratum. Surface runoff is very slow or ponded. The seasonal high water table is at or near the surface from late fall through late spring. The available water capacity is high. Depth to bedrock is more than 60 inches. If the soil has not been limed, the surface layer and the subsoil are slightly acid to very strongly acid.

A few small areas of this soil are used for pasture, but most areas are wooded or covered with brush or native, nonwoody plants.

Unless this soil is drained, it is not suited to cultivated crops or the production of high quality forage. In most areas drainage is difficult because the soil is on the lower parts of the landscape and suitable outlets are not available. In undrained areas forage productivity is low. Also, the seasonal high water table shortens the period of grazing. Overgrazing and grazing during periods of excessive wetness cause surface compaction and deterioration of the sod cover.

Potential productivity of red maple on this soil is moderate. Erosion is a slight hazard, but the equipment limitation, seedling mortality, and windthrow hazard are all severe because of the seasonal high water table.

The seasonal high water table and high potential frost action are severe limitations to use of this soil for most urban and recreation uses. Potential of the soil is good as habitat for wetland wildlife.

This soil is in capability subclass IVw.

AlC—Arnot-Lordstown complex, 0 to 15 percent slopes, very rocky. This map unit consists of nearly level to strongly sloping soils. It is about 40 percent Arnot soil, 40 percent Lordstown soil, and 20 percent other soils and rock outcrops. The Arnot soil is shallow and somewhat excessively drained to moderately well drained. The Lordstown soil is moderately deep and well drained. These soils are on hillsides and ridgetops on uplands. Areas of these soils are oblong or irregular in shape and range from about 5 to 75 acres in size. The Arnot and Lordstown soils are in such an intricate pattern that they could not be mapped separately at the scale selected for mapping. Rock outcrops make up 2 to 10 percent of an area and are about 100 to 300 feet apart. Narrow, clifflike escarpments of sandstone bedrock give many areas the appearance of stairsteps.

Typically, the surface layer of the Arnot soil is covered by a thin layer of decomposed leaves and twigs. The surface layer is dark grayish brown channery loam about 2 inches thick. The subsoil is brownish yellow and yellowish brown very channery loam about 14 inches thick. Hard, light gray sandstone bedrock is at a depth of 16 inches.

Typically, the surface layer of the Lordstown soil is covered by a layer of dark reddish brown and black organic litter about 3 inches thick. The surface layer is brown silt loam about 3 inches thick. The subsoil is dark brown and brown channery loam about 22 inches thick. Hard, gray sandstone bedrock is at a depth of 25 inches.

Included with this unit in mapping are small areas of very deep, well drained Valois and Swartswood soils and very deep, moderately well drained Wurtsboro soils. Also included are small areas of shallow, poorly drained and somewhat poorly drained Tuller soils and moderately deep, moderately well drained soils. Small areas of very stony or bouldery soils are common, especially below the steeper slopes or escarpments. The included soils and areas of rock outcrops range to about 5 acres in size.

The seasonal high water table in the Arnot soil is perched above bedrock for brief periods in spring, but is generally at a depth of more than 6 feet. Permeability, or rate of water movement through the soil, is moderate. Surface runoff is rapid. The available water capacity is low or very low. Bedrock is at a depth of 10 to 20 inches. Soil reaction ranges from extremely acid to moderately acid.

The seasonal high water table in the Lordstown soil is usually not perched above bedrock. Permeability is moderate. Surface runoff is medium. The available water capacity is moderate. Bedrock is at a depth of 20 to 40 inches. Soil reaction ranges from slightly acid to very strongly acid.

A few areas of the soils in this map unit are used for farming. Most areas are idle or forested.

These soils are not suited to cultivated crops and are poorly suited to hay and pasture. Forage yields are low in areas used for hay and pasture. Rock outcrops and

rock fragments on the surface or in the soils interfere with farming operations. In most years droughtiness is a problem in summer. In pasture management, during dry periods timely deferred grazing and stocking rates within carrying capacity improve forage yields and help to control erosion.

Potential productivity of northern red oak is moderate on the Arnot soil and moderately high on the Lordstown soil. On the Arnot soil, the rooting depth is severely restricted and seedling mortality is high. On the Arnot soil, windthrow is a moderate hazard. On both soils, rock outcrops interfere with machine planting.

Depth to bedrock and rock outcrops are limitations of these soils for urban uses. Careful site selection is required.

These soils are in capability subclass VIs.

AlE—Arnot-Lordstown complex, 15 to 35 percent slopes, very rocky. This map unit consists of moderately steep and steep soils. It is about 40 percent Arnot soils, 40 percent Lordstown soils, and 20 percent other soils and rock outcrops. The Arnot soil is shallow and somewhat excessively drained to moderately well drained. The Lordstown soil is moderately deep and well drained. These soils are on hillsides and ridgetops on uplands. Areas of these soils are oblong or irregular in shape and range from about 5 to 75 acres in size. The Arnot and Lordstown soils are in such an intricate pattern that they could not be mapped separately at the scale selected for mapping. Rock outcrops about 100 to 300 feet apart make up 2 to 10 percent of an area. Narrow, clifflike escarpments of sandstone bedrock give many areas the appearance of stairsteps.

Typically, the surface layer of the Arnot soil is covered by a thin layer of decomposed leaves and twigs. The surface layer is dark grayish brown channery loam about 2 inches thick. The subsoil is brownish yellow and yellowish brown very channery loam about 14 inches thick. Hard, light gray sandstone bedrock is at a depth of 16 inches.

Typically, the surface layer of the Lordstown soil is covered by a layer of dark reddish brown and black organic litter about 3 inches thick. The surface layer is brown silt loam about 3 inches thick. The subsoil is dark brown and brown channery loam about 22 inches thick. Hard, gray sandstone bedrock is at a depth of 25 inches.

Included with this unit in mapping are small areas of very deep, well drained Valois and Swartswood soils and very deep, moderately well drained Wurtsboro soils. Small areas of very stony or bouldery soils are common, especially below steeper slopes or escarpments. The included soils and areas of rock outcrops range to about 5 acres in size.

The seasonal high water table in the Arnot soil is perched above bedrock for brief periods in spring, but is generally at a depth of more than 6 feet. Permeability, or rate of water movement through the soil, is moderate. Surface runoff is very rapid. The available water capacity is low or very low. Bedrock is at a depth of 10 to 20 inches. Soil reaction ranges from extremely acid to moderately acid.

The seasonal high water table in the Lordstown soil is usually not perched above bedrock. Permeability is moderate. Surface runoff is rapid or very rapid. The available water capacity is moderate. Bedrock is at a depth of 20 to 40 inches. Soil reaction ranges from slightly acid to very strongly acid.

A few areas of the soils in this map unit are used for farming, but most areas are idle or forest.

These soils are not suited to cultivated crops, hay, or pasture. Forage yields are low in the less sloping areas that are used for hay or pasture. Slope, rock outcrops, and rock fragments on the surface or in the soils interfere with farming operations. Droughtiness is a problem in summer. In pasture management, during dry periods timely deferred grazing and stocking rates within carrying capacity improve forage yields and help to control erosion.

Potential productivity of northern red oak is moderate on the Arnot soil and moderately high on the Lordstown soil. On the Arnot soil, the rooting depth is severely restricted and seedling mortality is high. On both soils, slope and rock outcrops interfere with machine planting and the equipment limitation is moderate. On the Arnot soil, windthrow is a moderate hazard.

Slope, depth to bedrock, and inclusions of rock outcrops are severe limitations of these soils for most urban uses.

These soils are in capability subclass VIIs.

AoC—Arnot-Oquaga complex, 0 to 15 percent slopes, very rocky. This map unit consists of nearly level to strongly sloping soils. It is about 45 percent Arnot soil, 40 percent Oquaga soil, and 15 percent other soils and rock outcrops. The Arnot soil is shallow and somewhat excessively drained to moderately well drained. The Oquaga soil is moderately deep and excessively drained to well drained. These soils formed in glacial till on hillsides and ridgetops in uplands. Areas of these soils are oblong or irregular in shape and commonly range from about 5 to 50 acres in size. The Arnot and Oquaga soils are in such an intricate pattern on the landscape that they could not be mapped

separately at the scale selected for mapping. Outcrops of sandstone or shale bedrock, about 100 to 300 feet apart, make up 2 to 10 percent of an area.

Typically, the surface layer of the Arnot soil is covered by a thin layer of decomposed leaves and twigs. The surface layer is dark grayish brown channery loam about 2 inches thick. The subsoil is brownish yellow and yellowish brown very channery loam about 14 inches thick. Hard, light gray sandstone bedrock is at a depth of 16 inches.

Typically, the surface layer of the Oquaga soil is covered by a layer of black, decomposed leaves and twigs. The surface layer is dark reddish brown very channery silt loam about 4 inches thick. The subsoil is about 30 inches thick. It consists of layers of dark red, red, and reddish brown very channery loam. Weak red, thinly bedded shale bedrock is at a depth of 34 inches.

Included with this unit in mapping are small areas of very deep, well drained Cheshire and Lackawanna soils and very deep, moderately well drained Wellsboro soils. Also included are small areas of shallow, somewhat poorly drained or poorly drained Tuller soils and moderately deep, moderately well drained soils. Small areas of moderately stony or bouldery soils are common, especially below the steeper slopes or escarpments. The included soils and areas of rock outcrops range from 0.1 acre to 2 acres in size.

The seasonal high water table in the Arnot soil is perched above bedrock for brief periods in spring, but is generally at a depth of more than 6 feet. Permeability, or rate of water movement through the soil, is moderate. Surface runoff is rapid. The available water capacity is low or very low. Bedrock is at a depth of 10 to 20 inches. Soil reaction ranges from extremely acid to moderately acid.

The seasonal high water table in the Oquaga soil is usually not perched above bedrock. Permeability is moderate. Surface runoff is medium. The available water capacity is moderate. Bedrock is at a depth of 20 to 40 inches. Soil reaction ranges from extremely acid to moderately acid.

Some areas of the soils in this map unit are used for farming. Most areas are idle or forest.

These soils are not suited to cultivated crops. They are poorly suited to hay and pasture, especially in areas that are dominantly Arnot soil. Areas that are dominantly Oquaga soils are better suited to hay and pasture. Rock outcrops and rock fragments on the surface or in the soils interfere with farming operations. Droughtiness is commonly a problem in summer. In pasture management, timely deferred grazing and stocking rates within carrying capacity improve forage yields and help to control erosion.

Potential productivity of northern red oak on these soils is moderate. Especially in the Arnot soil, the rooting depth is restricted. On the Arnot soil, seedling mortality is severe and windthrow is a moderate hazard.

Depth to bedrock and inclusions of rock outcrops are severe limitations of these soils for most urban uses. Some possible sites for houses without basements are in areas of the moderately deep Oquaga soils, but careful site selection is important.

These soils are in capability subclass VIs.

AoE—Arnot-Oquaga complex, 15 to 35 percent slopes, very rocky. This map unit consists of moderately steep and steep soils. It is about 50 percent Arnot soil, 35 percent Oquaga soil, and 15 percent other soils and rock outcrops. The Arnot soil is shallow and somewhat excessively drained to moderately well drained. The Oquaga soil is moderately deep and excessively drained to well drained. These soils formed in glacial till on hillsides in uplands. Areas of these soils are oblong or irregular in shape and commonly range from about 5 to 50 acres in size. The Arnot and Oquaga soils are in such an intricate pattern on the landscape that they could not be mapped separately at the scale selected for mapping. Outcrops of sandstone or shale bedrock about 100 to 300 feet apart make up 2 to 10 percent of an area.

Typically, the surface layer of the Arnot soil is covered by a thin layer of decomposed leaves and twigs. The surface layer is dark grayish brown channery loam about 2 inches thick. The subsoil is brownish yellow and yellowish brown very channery loam about 14 inches thick. Hard, light gray sandstone bedrock is at a depth of 16 inches.

Typically, the surface layer of the Oquaga soil is covered by a layer of black, decomposed leaves and twigs. The surface layer is dark reddish brown very channery silt loam about 4 inches thick. The subsoil is about 30 inches thick. It consists of layers of dark red, red, and reddish brown very channery loam. Weak red, thinly bedded shale bedrock is at a depth of 34 inches.

Included with this unit in mapping are small areas of very deep, well drained Cheshire and Lackawanna soils and small areas of moderately stony and bouldery soils. The included soils and areas of rock outcrops range from about 0.1 acre to 2 acres in size.

The seasonal high water table in the Arnot soil is perched above bedrock for brief periods in spring, but is generally at a depth of more than 6 feet. Permeability, or rate of water movement through the soil, is moderate. Surface runoff is very rapid. The available

water capacity is low or very low. Bedrock is at a depth of 10 to 20 inches. Soil reaction ranges from extremely acid to moderately acid.

The seasonal high water table in the Oquaga soil is usually not perched above bedrock. Permeability is moderate. Surface runoff is rapid. Bedrock is at a depth of 20 to 40 inches. Soil reaction ranges from extremely acid to moderately acid.

Some areas of the soils in this map unit are used for pasture or hay. Most areas are idle or forest.

These soils are not suited to cultivated crops, hay, or pasture. The less sloping areas that are dominantly Oquaga soils are better suited to hay and pasture. Slope, rock outcrops, and rock fragments on the surface or in the soil interfere with farming operations. Droughtiness is common in summer. In pasture management, timely deferred grazing and stocking rates within carrying capacity improve forage yields and help to control erosion.

Potential productivity of northern red oak on these soils is moderate. Especially in the Arnot soil, the rooting depth is restricted. On the Arnot soil, seedling mortality is severe and windthrow is a moderate hazard. On both soils, slope is a moderate limitation for equipment operation.

Slope, depth to bedrock, and inclusions of rock outcrop are severe limitations of these soils for most urban uses.

These soils are in capability subclass VIIs.

ArC—Arnot-Rock outcrop complex, 0 to 15 percent slopes. This map unit consists of nearly level to strongly sloping soil and areas of exposed shale or sandstone bedrock. The Arnot soil is shallow and somewhat excessively drained to moderately well drained. It formed in glacial till derived from sandstone, siltstone, and shale on uplands. Most areas of the soil are oval and range from 15 to 40 acres in size. It is 60 percent Arnot soil, 25 percent Rock outcrop, and 15 percent other soils. The Arnot soil and areas of Rock outcrop are in such an intricate pattern that they could not be mapped separately at the scale selected for mapping.

Typically, the surface layer of the Arnot soil is covered by a thin layer of decomposed leaves and twigs. The surface layer is dark grayish brown channery loam about 2 inches thick. The subsoil is about 14 inches thick. In the upper part it is brownish yellow very channery loam. In the lower part it is yellowish brown very channery loam. Hard, light gray sandstone bedrock is at a depth of 16 inches

Rock outcrop consists of exposed reddish brown, grayish brown, or gray sandstone or shale.

Included with this unit in mapping, in deeper pockets of glacial till, are areas of Lackawanna, Valois, Cheshire, Swartswood, Wellsboro, and Wurtsboro soils. Areas of somewhat poorly drained or poorly drained Tuller soils are in wetter areas that are shallow to bedrock. Common inclusions are areas of moderately deep Oquaga and Lordstown soils and areas of very stony or extremely stony soils.

The seasonal high water table in the Arnot soil is perched above bedrock for brief periods in wet seasons but is generally at a depth of more than 6 feet. Permeability, or rate of water movement through the soil, is moderate above the bedrock. Surface runoff is rapid. The available water capacity is low or very low. Many rock fragments are throughout the Arnot soil. Bedrock limits rooting depth in the Arnot soil at a depth of 10 to 20 inches. Soil reaction ranges from extremely acid to moderately acid.

Some areas of the soils in this map unit are used for unimproved pasture. Most areas are woodland or brushland of native, nonwoody plants.

These soils are not suited to cultivated crops, hay, or pasture. High content of coarse fragments, shallow depth to bedrock, and rock outcrops make cultivation impractical. Areas that are dominantly Arnot soil are better suited to pasture, but predicted yields are low. Droughtiness is a problem because of the shallow depth to bedrock and content of coarse fragments. It reduces the carrying capacity of the pasture. Stocking rates within carrying capacity, timely deferred grazing, and applications of fertilizer improve forage yields and help to control erosion.

Potential productivity of northern red oak on the Arnot soil is moderate. On the Arnot soil, windthrow is a moderate hazard and seedling mortality is severe. The equipment limitation is moderate. Areas of rock outcrop do not support woodland.

The limitations of the Arnot soil are severe for urban uses. Shallow depth to bedrock and rock outcrops are severe limitations to use of the Arnot soil as sites for septic tank absorption fields. Dwellings with or without basements are difficult to build because of shallow depth to bedrock. In the strongly sloping areas erosion is a hazard on construction sites.

The Arnot soil is in capability subclass VIs.

ArE—Arnot-Rock outcrop complex, 15 to 35 percent slopes. This map unit consists of moderately steep and steep soil and areas of exposed shale or sandstone bedrock. It is about 55 percent Arnot soil, 30 percent rock outcrop, and 15 percent other soils. The

Arnot soil is shallow and somewhat excessively drained to moderately well drained. It is on uplands. It formed in glacial till derived from sandstone, siltstone, and shale. Most areas are wide and irregular in shape and range from 15 to 50 acres in size. The Arnot soil and areas of Rock outcrop are in such an intricate pattern that they could not be mapped separately at the scale selected for mapping. Sandstone and shale rock fragments are extensive.

Typically, the surface layer of the Arnot soil is covered by a thin layer of decomposed leaves and twigs. The surface layer is dark grayish brown channery loam about 2 inches thick. The subsoil is brownish yellow and yellowish brown very channery loam about 14 inches thick. Hard, light gray sandstone is at a depth of 16 inches.

Rock outcrop consists of exposed reddish brown, gray, or grayish brown sandstone or shale.

Included with this unit in mapping, in deeper pockets of glacial till, are areas of Lackawanna, Valois, Cheshire, Swartswood, Wellsboro, and Wurtsboro soils. Also included are areas of moderately deep Oquaga and Lordstown soils and very stony and extremely stony soils.

Permeability in the Arnot soil is moderate. The available water capacity is low or very low. Surface runoff is very rapid. Bedrock limits the rooting depth. Soil reaction ranges from extremely acid to moderately acid.

Nearly all areas of the Arnot soil in this map unit are forest (fig. 6).

This Arnot soil is not suited to cultivated crops, hay, or pasture. High content of rock fragments, rock outcrops, and steep slopes make most farming operations impractical. Droughtiness is a problem because of shallow depth to bedrock, rock outcrops, and rock fragments on and in the soil. In farmed areas erosion is a severe hazard.

Potential productivity of northern red oak is moderate on the Arnot soil. On the Arnot soil windthrow is a moderate hazard and seedling mortality is severe. The equipment limitation is moderate. Areas of Rock outcrop generally do not support trees, although scrub oak will grow where a thin layer of soil material is on the bedrock.

The limitations of the Arnot soil are severe for urban uses. Shallow depth to bedrock and slope are severe limitations to use of the Arnot soil as sites for septic tank absorption fields. Shallow depth to bedrock and slope are severe limitations to use of the soil as sites for dwellings with or without basements. Erosion is a hazard on construction sites.

The Arnot soil is in capability subclass VIIs.

ArF—Arnot-Rock outcrop complex, 35 to 70 percent slopes. This map unit consists of very steep soil and areas of exposed shale or sandstone bedrock. It is about 45 percent Arnot soil, 40 percent Rock outcrop, and 15 percent other soils. The Arnot soil is shallow and somewhat excessively drained to moderately well drained. The Arnot soil formed in thin glacial deposits and in weathered local sandstone, siltstone, and shale rock fragments. It is on the sides of hills in uplands. Most areas are long and narrow in shape and range from 15 to 40 acres in size. The Arnot soil and areas of Rock outcrop are in such an intricate pattern that they could not be mapped separately at the scale selected for mapping.

Typically, the surface layer of the Arnot soil is covered by a thin layer of decomposed leaves and twigs. The surface layer is dark grayish brown channery loam about 2 inches thick. The subsoil is brownish yellow and yellowish brown very channery loam about 14 inches thick. Hard, light gray sandstone is at a depth of 16 inches.

Rock outcrop consists of exposed reddish brown, grayish brown, or brown sandstone or shale.

Included with this unit in mapping are small areas of moderately deep Lordstown and Oquaga soils and small areas of very stony and extremely stony soils. The included soils range to 3 acres in size.

Permeability in the Arnot soil is moderate. The available water capacity is low or very low. Bedrock limits rooting depth. Surface runoff is very rapid. Soil reaction ranges from extremely acid to moderately acid. Rock fragments of sandstone and shale are very common.

Nearly all areas of the Arnot soil in this map unit are forest or brushland.

The Arnot soil is not suited to agriculture. Very steep slopes and exposed bedrock are severe limitations for all farming operations. Carefully maintaining a cover of natural vegetation helps to control erosion.

Potential productivity of northern red oak on the Arnot soil is moderate. On the Arnot soil, windthrow is a moderate hazard and seedling mortality is severe. The equipment limitation is severe. Areas of Rock outcrop do not support woodland.

Slope and rock outcrops are severe limitations of the Arnot soil for urban development.

The Arnot soil is in capability subclass VIIs.

Bb—Barbour loam. This is a very deep, nearly level, well drained soil in level areas along streams and on

Figure 6.—A wooded area of Arnot-Rock outcrop complex, 15 to 35 percent slopes. Some areas are in recreation use. A few areas are quarried for building stone.

flood plains and terraces. It formed in recent alluvium. It is subject to rare flooding. Areas of the soil along stream channels are long, and broad to narrow and range from 10 to 20 acres or more in size. Slope ranges from 0 to 3 percent.

Typically, the surface layer is dark reddish brown loam about 8 inches thick. The subsoil extends to a depth of about 30 inches. In the upper part it is reddish brown loam, in the middle part it is yellowish red loam, and in the lower part it is reddish brown very fine sandy loam. The substratum to a depth of 60 inches or more is loose, reddish brown very gravelly loamy sand.

Included with this soil in mapping are areas of soils that are similar to this Barbour soil but that have a high content of gravel. Also included are areas of sandy, excessively drained Suncook soils and somewhat poorly drained Bash soils. Also included are some areas of yellowish brown, well drained Pope soils and moderately well drained Philo soils. Also included, where streams are very narrow, are poorly drained or very poorly drained Wayland soils and undifferentiated stream deposits called Fluvaquents and Udifluvents.

The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Barbour soil is at a depth of 3 to 6 feet from January through April. Permeability is moderate in the surface layer, moderately rapid in the subsoil, and rapid in the substratum. The available water capacity is moderate. Surface runoff is medium or slow. If the soil has not been limed, the surface layer and the subsoil range from very strongly acid to moderately acid and the substratum ranges from very strongly acid to slightly acid.

Most areas of this soil are used for cultivated crops or pasture. Other areas are idle or forest.

This soil is well suited to cultivated crops. Although it is subject to rare flooding, flooding does not normally occur during the growing season. It is among the soils in the county that are best suited to food and fiber production. Cover crops, crop rotation, and crop residue use help to increase infiltration and to maintain soil tilth. Planting trees and other vegetative cover along streambanks help to reduce streambank erosion and to provide wildlife cover.

This soil is well suited to hay and pasture. Applications of lime and fertilizer, weed control, pasture rotation, stocking rates within carrying capacity, timely harvesting, or deferred grazing help to keep the pasture or the hayland in good condition.

Potential productivity of sugar maple on this soil is moderate. There are few or no limitations to woodland use and management.

Rare flooding and the seasonal high water table are severe limitations to use of this soil as sites for sanitary facilities and for urban development.

This soil is in capability class I.

Bs—Bash silt loam. This is a very deep, nearly level, somewhat poorly drained soil on flood plains. In most years it is subject to occasional flooding from December through April. Many areas have been dissected by old stream channels. Areas of the soil are long and broad to narrow along streams and range from about 5 to 30 acres in size. Slope ranges from 0 to 3 percent.

Typically, the surface layer is about 5 inches thick. It is dark reddish gray silt loam in the upper part and dark reddish brown silt loam in the lower part. The subsoil extends to a depth of about 22 inches. It is reddish brown silt loam that has thin lenses of loamy fine sand. The substratum to a depth of 60 inches or more consists of reddish gray and dark brown fine sandy loam.

Included with this soil in mapping are areas of soils that have a very gravelly surface layer or subsurface layer. Also included are sandy, excessively drained Suncook soils and well drained Barbour soils. Also included, in some places, are yellowish brown, well drained Pope soils and moderately well drained, yellowish brown Philo soils. Also included, in some areas where streams are very narrow, are poorly drained or very poorly drained Wayland soils and undifferentiated stream deposits called Fluvaquents and Udifluvents. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Bash soil is at a depth of 0.5 to 1.5 feet from midwinter to midspring. Permeability is moderate in the surface layer and the subsoil and moderately rapid to moderately slow in the substratum. The available water capacity is high. Surface runoff is slow. If the soil has not been limed, the surface layer and the subsoil range from extremely acid to strongly acid and the substratum ranges from very strongly acid to moderately acid.

Some areas of this soil have been cleared and are used for pasture and hay. Most areas are forest or covered with brush or native, nonwoody plants.

This soil is moderately suited to most crops grown in the county. In many years, the seasonal high water table and flooding hinder farming operations. In most years flooding does not normally occur during the growing season, but when it occurs in some places it erodes the surface layer or leaves deposits of sand, gravel, or other debris on the surface. Removal of snags, gravel deposits, and other obstructions is needed periodically. A combination of subsurface drains is needed that outlet into an open channel. Where drained, this soil is among those in the county that are best suited to food and fiber production.

This soil is well suited to hay or pasture, although in some years the seasonal high water table and old stream channels interfere with harvesting operations. Restricted grazing during wet periods help to maintain the sod cover and the pasture.

Potential productivity of red maple on this soil is moderate. The equipment limitation, seedling mortality, and windthrow hazard are moderate.

Flooding, the seasonal high water table, slow permeability, and potential frost action are severe limitations to use of this soil as sites for sanitary facilities and for building site development. Potential of the soil is good for habitat for wildlife.

This soil is in capability subclass IIIw.

Ca—Carlisle muck. This is a very deep, nearly level, very poorly drained soil in depressions, bogs, and marshes within glacial till plains and outwash plains. It is subject to ponding. Areas of the soil are round or irregular in shape and range from 3 to 25 acres or more in size. Slope ranges from 0 to about 2 percent.

Typically, the surface layer of this soil is black, well decomposed muck about 12 inches thick. The subsurface layer extends to a depth of about 40 inches. In the upper part it is firm, black, well decomposed muck, and in the lower part it is dark reddish brown, well decomposed muck. The bottom layer is friable, dark reddish brown, well decomposed muck to a depth of 60 inches or more.

Included in this soil in mapping are small areas of Palms soils that consist of muck or other organic material less than 51 inches thick over mineral material. Also included are small areas of soils that consist of silty alluvial deposits over organic material. Also included are small areas of Wayland, Red Hook, Neversink, and Alden soils. Wayland soils are poorly drained or very poorly drained, silty soils along streams and rivers. Red Hook soils are somewhat poorly drained, loamy soils that have pebbles or cobbles throughout. Neversink and Alden soils are poorly drained and very poorly drained soils that formed in loamy material. The included soils range from about 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Carlisle soil is above or near the surface in fall, winter, and spring. Depth to bedrock is more than 60 inches. Permeability is moderate. Surface runoff is ponded or very slow. The available water capacity is high. If the soil has not been limed, the surface layer is strongly acid to neutral and the subsoil is moderately acid to neutral.

Most areas of this soil have not been drained and are covered with brush or trees. Some areas have a cover of grasses or other herbaceous plants.

This soil is poorly suited to cultivated crops and pasture. The seasonal high water table and ponding of surface runoff for prolonged periods of the year are serious limitations for most agricultural uses. Drainage is not feasible in many areas because suitable outlets are not available. Also, drainage increases subsidence and the rate of decomposition of the organic material. A system of water management that lowers the water table only during the growing season will reduce subsidence and decomposition.

Potential productivity of red maple on this soil is moderate. The equipment limitation, seedling mortality, and windthrow hazard are severe because of the seasonal high water table, ponding of water on the surface, and low soil strength.

Ponding, excess humus, potential frost action, and low strength of the subsurface layer are severe limitations to use of this soil for building site development. Ponding, slow permeability, seepage, and excess humus are severe limitations for sanitary facilities.

This soil is in capability subclass Vw.

Ce—Carlisle, Palms, and Alden soils, ponded. These are very deep, very poorly drained soils in freshwater marshes. Some areas are just one of these soils, and some consist of two or all three of them in variable proportions. The total acreage of the unit is about 25 percent each of Carlisle, Palms, and Alden soils and 25 percent other soils. These soils are in level, ponded areas in upland depressions bordering lakes or streams. They formed in organic material, in organic material over glacial till, or in glacial till. They are ponded with 1 to 3 feet of water during most of the year. Mapped areas are oval or irregular in shape and range from 3 to 100 acres in size.

Typically, the surface layer of the Carlisle soils is black, well decomposed muck about 12 inches thick. The subsurface layer extends to a depth of 40 inches. In the upper part it is firm, black, well decomposed muck, and in the lower part it is friable, dark reddish brown muck. The bottom layer is friable, dark reddish brown muck to a depth of 60 inches or more.

Typically, the surface layer and the subsurface layer of the Palms soils are black muck to a depth of about 22 inches. The substratum consists of layers of grayish brown, gray, and red fine sandy loam, loam, and silt loam to a depth of 60 inches or more.

Typically, the surface layer of the Alden soils is black silt loam about 12 inches thick. The subsoil, to a depth of 33 inches, is firm, gray silt loam. The substratum is brown channery silt loam and reddish gray gravelly silt loam to a depth of 60 inches or more.

Included with these soils in mapping are small areas of poorly drained and very poorly drained Wayland soils and undifferentiated stream deposits called Fluvaquents and Udifluvents along streams. The included soils are as much as 2 acres in size.

Carlisle, Palms, and Alden soils are covered with 1 to 3 feet of water during most of the year. Permeability of the Carlisle and Palms soils is moderately rapid to moderately slow. Permeability of the Alden soils is moderate in the surface layer and slow or moderately slow below. Depth to bedrock is more than 60 inches. Reaction in the Carlisle soils ranges from very strongly

acid to neutral. Reaction in the Palms soils ranges from strongly acid to neutral, and that in the Alden soils ranges from slightly acid to very strongly acid.

Most areas of this unit support scattered, water-tolerant or aquatic, nonwoody plants. Some areas, generally behind beaver dams, support scattered trees.

Onsite investigation is needed to determine if these soils can be used for a specific farm or nonfarm use.

Most areas can be used for some types of recreation and can provide good habitat for wetland wildlife (fig. 7). Generally, constructing islands or nesting sites helps to improve habitat for wildlife.

These soils are in capability subclass VIIIw.

ChA—Chenango gravelly loam, 0 to 3 percent slopes. This is a very deep, nearly level, well drained or somewhat excessively drained soil on glacial outwash plains and terraces. Areas of the soil are oblong or irregular in shape and range from 5 to 10 acres in size.

Typically, the surface layer is friable, dark brown gravelly loam about 4 inches thick. The subsoil in the upper part is yellowish brown very gravelly loam about 12 inches thick. In the lower part it is yellowish brown very gravelly loam about 15 inches thick. The substratum is loose, yellowish brown very gravelly loamy coarse sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of less gravelly Valois soils. Also included, in the wetter areas, are moderately well drained or somewhat poorly drained Pompton soils and somewhat poorly drained Red Hook soils. In areas of coarser textured materials, Otisville soils are also included. Areas of soils that have stones on the surface are included and are indicated on the soil map by special symbols. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Chenango soil is generally not above a depth of 6 feet. The available water capacity is low or moderate. Surface runoff is slow. Permeability is moderate or moderately rapid in the surface layer and the subsoil. If the soil has not been limed, the surface layer is very strongly acid or strongly acid and the subsoil ranges from very strongly acid to moderately acid.

In some areas this soil is used for farming, but most areas are covered with brush and nonwoody plants or are forest. Some areas are used as sites for single family homes or are in recreation use.

This soil is well suited to cultivated crops. It is among the soils in the county that are best suited to food and fiber production. The main limitations are slight droughtiness and rock fragments. Erosion is a hazard. Increasing organic matter content and improving tilth are management concerns. Conservation tillage, cover crops, and crop rotation help to maintain productivity, to control erosion, and to increase water availability.

In pasture management, overgrazing and grazing for prolonged periods during droughts are management concerns. Grazing during dry periods causes deterioration of the sod cover. Stocking ranges within carrying capacity during dry periods and drought-tolerant pasture plants help to keep the pasture in good condition.

Potential productivity of sugar maple on this soil is moderate. The erosion hazard, the equipment limitation, seedling mortality, and windthrow hazard are slight.

The limitations to use of this soil as sites for dwellings and small commercial buildings are slight. Seepage is a limitation for septic tank absorption fields. If this soil is used as sites for septic tank absorption fields, ground water contamination is a hazard because the soil does not adequately filter the effluent. Potential frost action is a moderate limitation for local roads and streets. Cave-ins are severe limitations for shallow excavations.

This soil is in capability subclass IIs.

ChB—Chenango gravelly loam, 3 to 8 percent slopes. This is a very deep, gently sloping, well drained or somewhat excessively drained soil on parts of glacial outwash plains and terraces (fig. 8). Areas of the soil are oblong or irregular in shape and range from 5 to 10 acres or more in size.

Typically, the surface layer is dark brown, gravelly loam about 4 inches thick. The subsoil in the upper part is yellowish brown very gravelly loam about 12 inches thick. In the lower part it is yellowish brown very gravelly loam about 15 inches thick. The substratum is loose, yellowish brown very gravelly loamy coarse sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of less gravelly Valois soils. Also included, in the wetter areas, are moderately well drained or somewhat poorly drained Pompton soils and somewhat poorly drained Red Hook soils. In areas of coarser textured materials, Otisville soils are also included. Areas of soils that have surface stones are included and are indicated on the soil map by special symbols. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Chenango soil is generally not above a depth of 6 feet. The available water capacity is low or moderate. Surface runoff is slow. Permeability is moderate or moderately rapid in

Figure 7.—The Carlisle, Palms, and Alden soils, ponded, are in freshwater marshes that provide habitat for beaver, ducks, and other wetland wildlife.

the surface layer and the subsoil. If the soil has not been limed, the surface layer is very strongly acid or strongly acid and the subsoil ranges from very strongly acid to moderately acid.

In some areas this soil is farmed, but most areas are covered with brush and nonwoody plants or are forest. Some areas are used as sites for single-family homes or are in recreation use.

This soil is well suited to cultivated crops. It is among the soils in the county that are best suited to food and fiber production. Erosion is a hazard. The main limitations are slight droughtiness and rock fragments. Increasing organic matter content and improving tilth are management concerns. Conservation tillage and crop rotation help to control erosion. Cover crops and regularly adding organic material to the soil help to increase infiltration and water availability.

In pasture management, overgrazing and grazing for prolonged periods during droughts are management concerns. Grazing during dry periods will cause deterioration of the sod cover. Stocking rates with carrying capacity during dry periods and drought-tolerant pasture plants help to keep the pasture in good condition.

Potential productivity of sugar maple on this soil is moderate. The erosion hazard, the equipment limitation, seedling mortality, and windthrow hazard are slight.

The limitations to use of this soil as sites for dwellings and small commercial buildings are slight. Seepage is a limitation for septic tank absorption fields. If this soil is used as sites for septic tank absorption fields, ground water contamination is a hazard because the soil does not adequately filter the effluent. Potential frost action is a moderate limitation for local roads and

Figure 8.—Chenango gravelly loam, 3 to 8 percent slopes, is commonly a good source of gravel for use in construction.

streets. Cave-ins are severe limitations for shallow excavations.

This soil is in capability subclass IIs.

ChC—Chenango gravelly loam, 8 to 15 percent slopes. This is a very deep, strongly sloping, well drained or somewhat excessively drained soil on the sides of glacial outwash terraces and small hills on valley sides. Areas of the soil are oblong or irregular in shape and range from 5 to 10 acres in size.

Typically, the surface layer is dark brown, gravelly loam about 4 inches thick. The subsoil in the upper part is yellowish brown very gravelly loam about 12 inches thick. In the lower part it is yellowish brown very gravelly loam about 15 inches thick. The substratum is loose, yellowish brown very gravelly loamy coarse sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of less gravelly Valois soils. Also included, in the wetter areas, are moderately well drained or somewhat poorly drained Pompton soils. In areas of coarser textured materials, Otisville soils are also included. Areas of soils that have surface stones are included and are indicated on the soil map by special symbols. The included soils range to as much as 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Chenango soil is generally not above a depth of 6 feet. The available water capacity is low or moderate. Surface runoff is medium. Permeability is moderate or moderately rapid

in the surface layer and the subsoil. If the soil has not been limed, the surface layer is very strongly acid or strongly acid and the subsoil ranges from very strongly acid to moderately acid.

In some areas this soil is used for farming, but most areas are covered with brush or nonwoody plants or are forest. Some areas are used as sites for single family homes or are in recreation use.

This soil is moderately suited to cultivated crops, but it is better suited to hay and pasture. The main limitations are slope, droughtiness, and rock fragments. Erosion is a hazard. Conservation tillage and crop rotation help to control erosion. Crop residue use, cover crops, and regularly adding organic matter to the soil help to maintain soil tilth and to increase infiltration and water availability.

In pasture, overgrazing and grazing during droughts are management concerns. Grazing during dry periods will cause deterioration of the sod cover and increase the erosion hazard. Stocking rates within carrying capacity during dry periods and drought-tolerant pasture plants are management concerns.

Potential productivity of sugar maple on this soil is moderate. The erosion hazard, the equipment limitation, seedling mortality, and windthrow hazard are slight.

Excess sand and rapid seepage are severe limitations to use of this soil as sites for sanitary facilities. If this soil is used as sites for septic tank absorption fields, ground water contamination is a hazard because the soil does not adequately filter the effluent. Slope is also a moderate limitation for dwellings. Cutbanks in excavations are subject to caving in. Some areas are a good source of gravel.

This soil is in capability subclass IIIe.

ChD—Chenango gravelly loam, 15 to 25 percent slopes. This is a very deep, moderately steep, well drained to somewhat excessively drained soil on the sides of glacial outwash terraces and small hills on valley sides. Areas of the soil are oblong or rounded in shape and range from about 5 to 10 acres in size.

Typically, the surface layer is dark brown, gravelly loam about 4 inches thick. The subsoil in the upper part is yellowish brown very gravelly loam about 12 inches thick. In the lower part it is yellowish brown very gravelly loam about 15 inches thick. The substratum is loose, yellowish brown very gravelly loamy coarse sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of less gravelly Riverhead and Valois soils. In areas of coarser textured materials, Otisville soils are also included. Areas of soils that have surface stones are included and are indicated on the soil map by special symbols. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Chenango soil is generally not above a depth of 6 feet. The available water capacity is low or moderate. Surface runoff is medium. Permeability is moderate or moderately rapid in the surface layer and the subsoil. If the soil has not been limed, the surface layer is very strongly acid or strongly acid and the subsoil ranges from very strongly acid to moderately acid.

In some areas this soil is used for farming, but most areas are covered with brush and nonwoody plants or are forest.

This soil is poorly suited to cultivated crops, but it is better suited to hay and pasture. The main limitations are slope, droughtiness, and rock fragments. Erosion is a hazard.

This soil is suited to hay and pasture. Slope limits use of equipment and in midsummer droughtiness limits yields. Restricted grazing during dry periods, rotation grazing, and stocking rates within carrying capacity help to maintain a permanent sod cover and to control erosion.

Potential productivity of sugar maple on this soil is moderate. In some areas droughtiness is a problem in establishing new plantings. Erosion is a moderate hazard, and the equipment limitation is moderate.

Slope is a severe limitation to use of this soil as sites for dwellings and small commercial buildings. Slope is a severe limitation for sanitary facilities. If the soil is used as sites for septic tank absorption fields, ground water contamination is a hazard because of seepage. Some areas are a good source of gravel.

This soil is in capability subclass IVe.

CsB—Cheshire channery loam, 3 to 8 percent slopes, stony. This is a very deep, gently sloping, well drained soil on till plains and small plateaus on uplands. Stones 10 inches or more in diameter and about 10 to 200 feet apart cover 0.01 to 3 percent of the surface. Slopes are smooth and slightly convex. Areas of the soil are oblong or irregular in shape and about 3 to 15 acres in size.

Typically, the surface layer is reddish brown channery loam about 5 inches thick. The subsoil in the upper part is yellowish red and reddish brown channery loam to a depth of 26 inches. In the lower part it is reddish brown channery silt loam to a depth of 36 inches. The substratum is reddish brown channery loam to a depth of 62 inches or more.

Included with this soil in mapping are small areas of

well drained Lackawanna and Swartswood soils and moderately well drained Wellsboro and Wurtsboro soils that all have a dense, slowly permeable subsoil. Also included, on higher parts of the landscape, are small areas of moderately deep Oquaga and Lordstown soils. Also included are some areas of very stony or bouldery soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in the Cheshire soil is generally more than 6 feet. The available water capacity is moderate. Surface runoff is medium. Permeability is moderate or moderately rapid. Depth to bedrock is generally more than 60 inches. If the surface has not been limed, the surface layer and the subsoil are very strongly acid to moderately acid.

In small areas this soil is used for cultivated crops, hay, or pasture. Many areas are forest or are idle.

This soil is well suited to cultivated crops. Stones, however, hinder tillage and other farming operations and cause greater than normal wear of machinery. Erosion is a hazard, especially on longer slopes. Contour farming or conservation tillage and cover crops help to control erosion and to maintain productivity.

This soil is well suited to pasture and hay, but in some areas stones hinder the use of farm machinery. Stocking rates within carrying capacity prevent overgrazing and help to control erosion and to keep the pasture in good condition.

Potential productivity of northern red oak on this soil is moderate. There are no limitations to woodland use and management.

This soil is well suited to use as sites for dwellings and septic tank absorption fields and for local streets and roads. Moderately rapid permeability in the subsoil is a severe limitation to use of the soil as sites for sewage lagoons and sanitary landfills.

This soil is in capability subclass IIe.

CsC—Cheshire channery loam, 8 to 15 percent slopes, stony. This is a very deep, strongly sloping, well drained soil on the upper parts of valley sides and hillsides on uplands. Stones 10 inches or more in diameter and about 10 to 200 feet apart cover 0.01 to 3 percent of the surface. Slopes are smooth and slightly convex. Areas of the soil are oblong or irregular in shape and about 5 to 20 acres in size.

Typically, the surface layer is reddish brown channery loam about 5 inches thick. The subsoil in the upper part is yellowish red and reddish brown channery loam to a depth of 26 inches. In the lower part it is reddish brown channery silt loam to a depth of 36 inches. The substratum is reddish brown channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small spots of well drained Lackawanna and Swartswood soils and moderately well drained Wellsboro and Wurtsboro soils that all have a dense, slowly permeable subsoil. Also included, on higher parts of the landscape, are spots of moderately deep Oquaga and Lordstown soils. Also included are some areas of very stony or bouldery soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Cheshire soil is normally more than 6 feet. The available water capacity is moderate. Surface runoff is medium or rapid. Permeability is moderate or moderately rapid. Depth to bedrock is generally more than 60 inches. If the soil has not been limed, the surface layer and the subsoil are very strongly acid to moderately acid.

Small areas of this soil are used for cultivated crops, hay, or pasture. Many areas are forest or are idle.

This soil is moderately suited to cultivated crops. Slope and stones, however, hinder tillage and other farming operations. Stones cause greater than normal wear of machinery. Erosion is a moderate hazard. In some areas diversions or terraces are needed to help to reduce runoff and to control erosion. Contour farming or conservation tillage, and cover crops help to control erosion and to maintain productivity.

This soil is well suited to pasture and hay, but in some areas stones and slope hinder the use of farm machinery. Stocking rates within carrying capacity prevent overgrazing and help to control erosion and to keep the pasture in good condition.

Potential productivity of northern red oak on this soil is moderate. There are no limitations to woodland use and management. Slope is a moderate limitation to use of this soil as sites for dwellings and for local roads and streets. The erosion hazard hinders intensive development. Moderately rapid permeability in the subsoil is a severe limitation to use of the soil as sites for sewage lagoons and sanitary landfills.

This soil is in capability subclass IIIe.

CsD—Cheshire channery loam, 15 to 25 percent slopes, stony. This is a very deep, moderately steep, well drained soil on the upper parts of valley sides and hillsides on uplands. Stones 10 inches or more in diameter and about 10 to 200 feet apart cover 0.01 to 3 percent of the surface. Slopes are smooth and slightly convex. Areas of the soil are oblong or irregular in shape and about 5 to 20 acres in size.

Typically, the surface layer is reddish brown channery loam about 5 inches thick. The subsoil in the

upper part is yellowish red and reddish brown channery loam to a depth of about 26 inches. In the lower part, to a depth of about 36 inches, it is reddish brown channery silt loam. The substratum is reddish brown channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of well drained Lackawanna and Swartswood soils that both have a dense, slowly permeable subsoil. Also included, on higher parts of the landscape, are small areas of moderately deep Oquaga and Lordstown soils. Also included are some areas of very stony or bouldery soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Cheshire soil is normally at a depth of more than 6 feet. The available water capacity is moderate. Surface runoff is rapid. Permeability is moderate or moderately rapid. Depth to bedrock is generally more than 60 inches. In unlimed areas the surface layer and the subsoil are very strongly acid to moderately acid.

Small areas of this soil have been cleared and are used for hay or pasture. Most areas are forest or are idle.

This soil is poorly suited to cultivated crops because of slope and the hazard of erosion. Stones hinder farming operations and cause greater than normal wear of machinery. Extensive erosion control and runoff control measures are needed if the soil is used for cultivated crops. Diversions and terraces help to reduce runoff and to control erosion. Contour farming or conservation tillage, a high proportion of sod crops in rotation, and cover crops help to control erosion and to maintain productivity.

This soil is suited to pasture and hay, but in some areas stones and slope hinder the use of modern farm machinery. Stocking rates within carrying capacity prevent overgrazing and help to control erosion and to keep the pasture in good condition.

Potential productivity of northern red oak on this soil is moderate. Slope is a moderate limitation to use of equipment. Erosion is a moderate hazard. Slope is a severe limitation to use of this soil for building site development. In addition, erosion is a hazard. Slope and seepage are severe limitations on sites for sanitary facilities.

This soil is in capability subclass IVe.

CsE—Cheshire channery loam, 25 to 35 percent slopes, stony. This is a very deep, steep, well drained soil on the upper parts of valley sides and hillsides on uplands. Stones 10 inches or more in diameter and about 10 to 200 feet apart cover 0.01 to 3 percent of the surface. Slopes are smooth and slightly convex. Areas of the soil are long and narrow or irregular in shape and range from about 5 to 30 acres in size.

Typically, the surface layer is reddish brown channery loam about 5 inches thick. The subsoil in the upper part is yellowish red and reddish brown channery loam to a depth of about 26 inches. In the lower part it is reddish brown channery silt loam to a depth of about 36 inches. The substratum is reddish brown channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of well drained Lackawanna and Swartswood soils that both have a dense, slowly permeable subsoil. Also included, on higher parts of the landscape, are small areas of moderately deep Oquaga and Lordstown soils. Also included are some areas of very stony or bouldery soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Cheshire soil is generally at a depth of more than 6 feet. The available water capacity is moderate. Surface runoff is rapid. Permeability is moderate or moderately rapid. Depth to bedrock is generally more than 60 inches. If the soil has not been limed, the surface layer and the subsoil are very strongly acid or moderately acid.

Most areas of this soil are forest, and a few areas are idle (fig. 9). The soil is not suited to cultivated crops because of slope and the severe hazard of erosion.

This soil in small areas is suited to pasture, but stones and the steep slope limit use of modern farm machinery. Stocking rates within carrying capacity prevent overgrazing and help to control erosion and to maintain needed sod cover.

Potential productivity of northern red oak on this soil is moderate. Slope is a moderate limitation to use of equipment. Erosion is a moderate hazard.

Slope and the severe erosion hazard are severe limitations of this soil for building site development. Slope and seepage are severe limitations on sites for sanitary facilities. Potential of the soil is good as habitat for woodland wildlife.

This soil is in capability subclass VIe.

CsF—Cheshire channery loam, 35 to 60 percent slopes, stony. This is a very deep, very steep, well drained soil on the upper parts of valley sides and hillsides on uplands. Stones 10 inches or more in diameter and about 10 to 200 feet apart cover 0.01 to 3 percent of the surface. Slopes are smooth. Areas of the soil are mostly long and narrow and about 5 to 30 acres in size.

Typically, the surface layer is reddish brown

Figure 9.—Cheshire channery loam, 25 to 35 percent slopes, stony, is common in areas along the valley sides adjacent to Callicoon Creek. These areas are mostly forest.

channery loam about 5 inches thick. In the upper part the subsoil is yellowish red and reddish brown channery loam to a depth of about 26 inches. In the lower part it is reddish brown channery silt loam to a depth of about 36 inches. The substratum is reddish brown channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small spots of well drained Lackawanna and Swartswood soils that both have a dense, slowly permeable subsoil. Also included, on higher parts of the landscape, are small areas of moderately deep Oquaga and Lordstown soils. Also included are some areas of very stony or bouldery soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Cheshire soil is generally at a depth of more than 6 feet. The available water capacity is moderate. Surface runoff is very rapid. Permeability is moderate or moderately rapid. Depth to bedrock is generally more than 60 inches. If the soil has not been limed, the surface layer and the subsoil are very strongly acid to moderately acid.

Most areas of the soil are forest. The soil is not suited to cultivated crops, hay, or pasture because of very steep slopes and the severe hazard of erosion.

Potential productivity of northern red oak on this soil is moderate. Slope is a severe limitation to use of equipment. Erosion is a severe hazard.

Slope and the severe erosion hazard are severe limitations to use of this soil for building site development. Slope and seepage are severe limitations to use of the soil as sites for sanitary facilities. The soil can provide habitat for woodland wildlife.

This soil is in capability subclass VIIe.

EIB—Elka loam, 3 to 8 percent slopes, bouldery. This is a very deep, gently sloping, well drained soil on mountaintops and small plateaus or benches in the Catskill Mountains. Boulders 24 inches or more in diameter and 10 to 200 feet apart cover 0.01 to 3 percent of the surface. Slopes are smooth and slightly convex. Areas of the soil are oblong or irregular in shape and range from 3 to 15 acres in size.

Typically, the surface layer is dark reddish brown loam about 1 inch thick. The subsurface layer is dark reddish gray channery fine sandy loam about 4 inches thick. The subsoil, to a depth of 44 inches, consists of layers of dark reddish brown, reddish brown, and yellowish red channery loam and gravelly sandy loam. The substratum is reddish brown gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of well drained Lewbeach soils and moderately well drained Willowemoc soils, both of which have a dense, slowly permeable subsoil. Also included are spots of moderately deep Mongaup soils. Also included are some areas of nonbouldery soils. Also included are areas of very stony or very bouldery soils that are indicated by special symbols. The included soils range to about 3 acres and make up about 15 percent of the map unit.

The seasonal high water table in this Elka soil is generally not above a depth of 6 feet. The available water capacity is moderate. Surface runoff is medium. Permeability is moderate. Depth to bedrock is more than 40 inches and is generally more than 60 inches. If the soil has not been limed, the surface layer and the subsoil are very strongly acid to moderately acid.

Most areas of this soil are forest or are idle. A few small fields are used for pasture or hay.

This soil is well suited to cultivated crops, but boulders or stones hinder tillage and other farming operations. In most years the growing season is several weeks shorter than it is in parts of the county at lower elevations. Selecting short-season plants is a suitable management practice. Cover crops and contour farming or conservation tillage help to control erosion. Stocking rates within carrying capacity prevent overgrazing and help to control erosion.

Potential productivity of sugar maple on this soil is moderate. There are no limitations to woodland use and management.

The limitations to use of this soil as sites for dwellings and shallow excavations are slight. Moderate permeability in the substratum is a limitation on sites for septic tank absorption fields and sewage lagoons. Potential frost action is a moderate limitation for local roads and streets.

This soil is in capability subclass IIe.

EIC—Elka loam, 8 to 15 percent slopes, bouldery. This is a very deep, strongly sloping, well drained soil on mountaintops and mountainsides in the Catskill Mountains. Boulders 24 inches or more in diameter and 10 to 200 feet apart cover 0.01 to 3 percent of the surface. Slopes are smooth and slightly convex. Areas of the soil are oblong or irregular in shape and range from about 3 to 20 acres in size.

Typically, the surface layer is dark reddish brown loam about 1 inch thick. The subsurface layer is dark reddish gray channery fine sandy loam about 4 inches thick. The subsoil, to a depth of 44 inches, consists of layers of dark reddish brown, reddish brown, and yellowish red channery loam and gravelly sandy loam. The substratum is reddish brown gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of well drained Lewbeach soils and moderately well drained Willowemoc soils, both of which have a dense, slowly permeable subsoil. Also included are spots of moderately deep Mongaup soils. Also included are areas of some nonbouldery soils. Also included are areas of very stony or very bouldery soils that are indicated by special symbols. The included soils range to about 3 acres and make up about 15 percent of the map unit.

The seasonal high water table in this Elka soil is generally not above a depth of 6 feet. The available water capacity is moderate. Surface runoff is medium or rapid. Permeability is moderate. Depth to bedrock is more than 60 inches. In unlimed areas the surface layer and the subsoil are very strongly acid to moderately acid.

Most areas of this soil are forest or are idle. A few small fields are used for pasture or hay.

This soil is moderately suited to cultivated crops, but boulders or stones hinder tillage and other farming operations. Slope and the hazard or erosion also limit intensive cultivation. In most years the growing season is several weeks shorter than it is in parts of the county at lower elevations. Favoring short-season plants is a suitable management practice. Cover crops, more sod crops in a rotation, and contour farming or conservation tillage help to control erosion. Limiting stocking rates prevents overgrazing and helps to control erosion.

Potential productivity of sugar maple on this soil is moderate. There are no limitations to woodland use and management.

Slope is a moderate limitation to use of this soil as sites for dwellings and local roads and streets. Moderate permeability in the substratum and slope are limitations on sites for septic tank absorption fields and sewage lagoons.

This soil is in capability subclass IIIe.

ElD—Elka loam, 15 to 25 percent slopes, bouldery. This is a very deep, moderately steep, well drained soil on mountainsides in the Catskill Mountains. Boulders 24 inches or more in diameter and 10 to 200 feet apart cover 0.01 to 3 percent of the surface. Slopes are smooth and slightly convex. Areas of the soil are oblong or irregular in shape and range from 5 to 30 acres in size.

Typically, the surface layer is dark reddish brown loam about 1 inch thick. The subsurface layer is dark reddish gray channery fine sandy loam about 4 inches thick. The subsoil, to a depth of about 44 inches, consists of layers of dark reddish brown, reddish brown, and yellowish red channery loam and gravelly sandy loam. The substratum is reddish brown gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of well drained Lewbeach soils that have a dense, slowly permeable subsoil. Also included are small areas of moderately deep Mongaup soils. Also included are some areas of nonbouldery soils. Also included are areas of very stony or very bouldery soils that are indicated by special symbols. The included soils range to about 3 acres and make up about 15 percent of the map unit.

The seasonal high water table in this Elka soil is generally not above a depth of 6 feet. The available water capacity is moderate. Surface runoff is rapid. Permeability is moderate. Depth to bedrock is more than 60 inches. If the soils have not been limed, the surface layer and the subsoil are very strongly acid to moderately acid.

Most areas of this soil are forest or are idle. A few small fields are used for pasture or hay.

This soil is poorly suited to cultivated crops because of slope and the erosion hazard. Boulders or stones also hinder tillage and other farming operations. In most years the growing season is several weeks shorter than it is in parts of the county at lower elevations. Selecting short season plants is a suitable management practice. Extensive erosion control and runoff control measures are needed if the soil is cultivated. It is better suited to hay or pasture, but slope limits use of farm machinery. Stocking rates within carrying capacity prevent overgrazing and help to control erosion.

Potential productivity of sugar maple on this soil is moderate. Slope is a moderate limitation to use of equipment.

Slope is a severe limitation to use of this soil for building site development. Erosion is a hazard. Slope and moderate permeability in the substratum are limitations on sites for sanitary facilities.

This soil is in capability subclass IVe.

ElE—Elka loam, 25 to 35 percent slopes, bouldery. This is a very deep, steep, well drained soil on mountainsides in the Catskill Mountains. Boulders 24 inches or more in diameter and 10 to 200 feet apart cover 0.01 to 3 percent of the surface. Slopes are smooth and slightly convex. Areas of the soil are elongated or irregular in shape and range from about 5 to 30 acres in size.

Typically, the surface layer is dark reddish brown loam about 1 inch thick. The subsurface layer is dark reddish gray channery fine sandy loam about 4 inches thick. The subsoil consists of layers of dark reddish brown, reddish brown, and yellowish red channery loam and gravelly sandy loam to a depth of about 44 inches. The substratum is reddish brown gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of well drained Lewbeach soils that have a dense, slowly permeable subsoil. Also included are small areas of moderately deep Mongaup soils. Also included are some areas of nonbouldery soils. Also included are areas of very stony or very bouldery soils that are indicated by special symbols. The included soils range to about 3 acres and make up about 15 percent of the map unit.

The seasonal high water table in this Elka soil is generally not above a depth of 6 feet. The available water capacity is moderate. Surface runoff is rapid. Permeability is moderate. Depth to bedrock is more than 60 inches. If the soil has not been limed, the surface layer and the subsoil are very strongly acid to moderately acid.

Most areas of this soil are forest. The soil is not suited to cultivated crops because of slope and the severe erosion hazard. Boulders or stones also hinder tillage and other farming operations. In most years the growing season is several weeks shorter than it is in other parts of the county.

This soil is poorly suited to pasture because of slope. Slope limits use of farm machinery and the period of time when the pasture can be stocked. Stocking rates within carrying capacity prevent overgrazing and help to control erosion.

Potential productivity of sugar maple on this soil is moderate. Slope is a moderate limitation to use of equipment.

Slope is a severe limitation to use of this soil for building site development and as sites for sanitary facilities. Erosion is a severe hazard.

This soil is in capability subclass VIe.

ElF—Elka loam, 35 to 50 percent slopes, bouldery. This is a very deep, very steep, well drained soil on mountainsides in the Catskill Mountains. Boulders 24 inches or more in diameter and 10 to 200 feet apart cover 0.01 to 3 percent of the surface. Slopes are smooth and slightly convex. Areas of the soil are elongated or irregular in shape and range from about 5 to 30 acres in size.

Typically, the surface layer is dark reddish brown loam about 1 inch thick. The subsurface layer is dark reddish gray channery fine sandy loam about 4 inches thick. The subsoil, to a depth of about 44 inches, consists of layers of dark reddish brown, reddish brown, and yellowish red channery loam and gravelly sandy loam. The substratum is reddish brown gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of well drained Lewbeach soils that have a dense, slowly permeable subsoil. Also included are small areas of moderately deep Mongaup soils. Also included are some areas of nonbouldery soils. Also included are areas of very stony or very bouldery soils that are indicated by special symbols. The included soils range to about 3 acres and make up about 15 percent of the map unit.

The seasonal high water table in this Elka soil is generally not above a depth of 6 feet. The available water capacity is moderate. Surface runoff is very rapid. Permeability is moderate. Depth to bedrock is more than 60 inches. If the soil has not been limed, the surface layer and the subsoil are very strongly acid to moderately acid.

Most areas of this soil are forest and a few areas are idle. The soil is not suited to cultivated crops or pasture because of slope and the severe erosion hazard. In most years the growing season is several weeks shorter than it is in other parts of the county.

Potential productivity of sugar maple on this soil is moderate. Slope is a severe limitation to use of equipment. Erosion is a moderate hazard.

Slope is a severe limitation to use of this soil for building site development and as sites for sanitary facilities. Erosion is a severe hazard. Potential of the soil is good as habitat for woodland wildlife.

This soil is in capability subclass VIIe.

Fu—Fluvaquents-Udifluvents complex, frequently flooded. This map unit is commonly called alluvial land and consists of very deep, excessively drained to very poorly drained, nearly level or gently sloping soils adjacent to streams. It is 45 percent Fluvaquents, 40 percent Udifluvents, and 15 percent other soils. The soils are in such an intricate pattern that they could not be mapped separately at the scale selected for mapping. Properties of both soils differ greatly within short distances. Areas of the soils are subject to frequent flooding and stream scour, streambank erosion, and shifting of soil deposits from place to place. They are mostly long and narrow and are adjacent to streams. They range from 3 to 20 acres but are most commonly 5 to 10 acres. Slope ranges from 0 to 5 percent, but is commonly less than 3 percent.

Typically, the surface layer of Fluvaquents is dark grayish brown and 1 to 10 inches thick. In some areas it is, in differing amounts, gravel and rock fragments. The substratum is mottled, gray to black, and reddish brown to dark brown sandy loam to silt loam and, in differing amounts, gravel or rock fragments. These soils range from slightly acid to very strongly acid.

Typically, the surface layer of Udifluvents is dark reddish brown, loamy, and 1 to 7 inches thick. It contains, in differing amounts, gravel or rock fragments. The substratum is reddish brown or dark reddish brown loamy or sandy material, and, in differing amounts, gravel or rock fragments. Reaction is slightly to strongly acid throughout.

Included with this unit in mapping are small areas of excessively drained Suncook soils and well drained Barbour and Pope soils. Also included are somewhat poorly drained Bash soils, moderately well drained Philo soils, and poorly drained or very poorly drained Wayland soils.

Areas of the soils in this map unit are mainly covered with brush or trees. They are not suited to cultivated crops and pasture because they are subject to frequent flooding.

Some areas of these soils can be developed for pond sites or as habitat for wildlife. Flooding and variable soil characteristics are limitations of these soils for most uses other than as unimproved pasture. Onsite investigation is needed for any intended use.

These soils are in capability subclass Vw.

Gn—Greenwood peat. This is a very deep, nearly level, very poorly drained soil in depressions in the Catskill Mountains. It is subject to ponding. Mapped

areas are rounded, oval, or irregular in shape and about 5 to 25 acres in size. Slope is 0 to 2 percent.

Typically, the surface layer of the Greenwood soil is black peat about 8 inches thick. The subsurface layer, to a depth of about 50 inches, is dark reddish brown mucky peat. The bottom layer is very dark brown mucky peat to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Ossipee soils that have a mineral substratum within a depth of 1.5 to 4 feet. Also included, at the edges of depressions, are small strips of mineral Suny soils. The included soils range to about 3 acres in size and make up about 15 percent of the map unit.

The water table in this Greenwood soil is at or near the surface most of the year. The available water capacity is high. Surface runoff is ponded or very slow. Permeability is rapid in the surface layer and moderate or moderately rapid in the subsurface and bottom layers. Depth to bedrock is more than 60 inches. The soil is extremely acid throughout.

This soil is covered with low-growing or brushy, wetland types of vegetation or water-tolerant trees.

This soil is not suited to farming or to crops commonly grown in the area because of very acid conditions and the seasonal high water table. The growing season is several weeks shorter than in other parts of the county at lower elevations. Extensive drainage is required to work the soil. Suitable outlets are commonly difficult to establish.

Potential productivity of black spruce on this soil is moderate. The seasonal high water table and low soil strength are severe limitations to use of equipment. The seasonal high water table causes high seedling mortality, severe windthrow hazard, and severe plant competition.

Excess humus, seepage, ponding, and low soil strength are severe limitations to use of this soil for building site development and as sites for sanitary facilities.

This soil is in capability subclass Vw.

HaC—Hawksnest-Mongaup loams, strongly sloping, very rocky. This map unit consists of nearly level to strongly sloping soils. It is about 40 percent Hawksnest soil, 40 percent Mongaup soil, and 20 percent other soils and rock outcrops. The Hawksnest soil is shallow and somewhat excessively drained or well drained. The Mongaup soil is moderately deep and well drained or moderately well drained. These soils are on mountainsides and ridgetops in the Catskill Mountains. Slope ranges from 0 to 15 percent. Areas of the soils are oblong or irregular in shape and range from about 5 to 75 acres or more. The Hawksnest and Mongaup soils are in such an intricate pattern that they could not be mapped separately at the scale selected for mapping. Rock outcrops, in areas about 100 to 300 feet apart, make up 2 to 10 percent of the area. Narrow, clifflike escarpments of sandstone bedrock give many areas the appearance of stairsteps.

Typically, the surface layer of the Hawksnest soil is covered with a layer of dark, rotted leaves and twigs about 2 inches thick. The surface layer is dark reddish brown loam about 1 inch thick. The subsurface layer is reddish gray channery loam to a depth of about 5 inches. The subsoil consists of layers of dark reddish brown loam and brown and dark reddish brown silt loam. Hard, grayish brown sandstone bedrock is at a depth of 16 inches.

Typically, the surface layer of the Mongaup soil is dark reddish brown loam about 3 inches thick. The subsoil is yellowish red and strong brown gravelly loam and brown sandy loam. Hard, grayish brown sandstone bedrock is at a depth of 22 inches.

Included with this unit in mapping are small areas of very deep, well drained Elka and Lewbeach soils and very deep, moderately well drained Willowemoc soils. Also included are small areas of shallow, somewhat poorly drained or poorly drained Torull soils and shallow, moderately well drained soils. Small areas of very stony or bouldery soils are common, especially below the steeper slopes or escarpments. The included soils and areas of rock outcrops range from 0.1 to about 5 acres in size.

The seasonal high water table in the Hawksnest soil is perched above bedrock for brief periods in spring but is usually below bedrock. Permeability, or rate of water movement through the soil, is moderate in the surface layer and moderate or moderately rapid below. Surface runoff is medium. The available water capacity is low or very low. Bedrock is at a depth of 10 to 20 inches. If the soil has not been limed, reaction is extremely acid to strongly acid.

The seasonal high water table in the Mongaup soil in some areas is perched above bedrock for brief periods in spring but is usually not above bedrock. Permeability is moderate. Surface runoff is medium. The available water capacity is moderate. Bedrock is at a depth of 20 to 40 inches. If the soil has not been limed, reaction is extremely acid to strongly acid.

A few areas of the soils in this map unit are used for farming, but most areas are idle or forest.

These soils are generally not suited to cultivated crops. In some areas they can produce a limited amount of hay or pasture. Rock outcrops and rock

fragments on the surface or in the soil interfere with farming operations. The growing season is several weeks shorter than in parts of the county at lower elevations. Droughtiness is common during dry periods in summer. Stocking rates within carrying capacity prevent overgrazing and help to control erosion.

Potential productivity of sugar maple on these soils is moderate. On the Hawksnest soil, rooting depth is severely restricted. Rock outcrops interfere with machine planting. On the Hawksnest soil, the windthrow hazard is moderate and seedling mortality is severe.

Rock outcrops and, on the Hawksnest soils, depth to bedrock are severe limitations to use of these soils as sites for sanitary facilities. Depth to bedrock is a severe limitation on sites for dwellings. Some building sites for homes without basements are on the Mongaup soil, but careful site selection is required.

These soils are in capability subclass VIs.

HaE—Hawksnest-Mongaup loams, steep, very rocky. This map unit consists of moderately steep and steep soils. It is about 40 percent Hawksnest soil, 40 percent Mongaup soil, and 20 percent other soils and rock outcrops. The Hawksnest soil is shallow and somewhat excessively drained or well drained. The Mongaup soil is moderately deep and well drained or moderately well drained. These soils are on mountainsides and ridgetops in the Catskill Mountains. Slope ranges from 15 to 35 percent. Areas of the soils are oblong or irregular in shape and range from about 5 to 75 acres or more. The Hawksnest and Mongaup soils are in such an intricate pattern that they could not be mapped separately at the scale selected for mapping. Rock outcrops, in areas about 100 to 300 feet apart, cover 2 to 10 percent of the areas. Narrow, clifflike escarpments of sandstone bedrock give many areas the appearance of stairsteps.

Typically, the surface layer of the Hawksnest soil is covered with a layer of dark, rotted leaves and twigs about 2 inches thick. The surface layer is dark reddish brown loam about 1 inch thick. The subsurface layer is reddish gray channery loam to a depth of about 5 inches. The subsoil consists of layers of dark reddish brown loam and brown and dark reddish brown silt loam. Hard, grayish brown sandstone bedrock is at a depth of 16 inches.

Typically, the surface layer of the Mongaup soil is dark reddish brown loam about 3 inches thick. The subsoil is yellowish red and strong brown gravelly loam and brown sandy loam. Hard, grayish brown sandstone bedrock is at a depth of 22 inches.

Included with this unit in mapping are small areas of very deep, well drained Elka and Lewbeach soils and very deep, moderately well drained Willowemoc soils. Small areas of very stony or bouldery soils are common, especially below the steeper slopes or escarpments. The included soils and areas of rock outcrops range from 0.1 to about 5 acres in size.

The seasonal high water table in the Hawksnest soil is perched above bedrock for brief periods in spring but is usually below bedrock. Permeability, or rate of water movement through the soil, is moderate in the surface layer and moderate or moderately rapid below. Surface runoff is rapid or very rapid. The available water capacity is low or very low. Bedrock is at a depth of 10 to 20 inches. If the soil has not been limed, reaction is extremely acid to strongly acid.

The seasonal high water table in the Mongaup soil is usually not perched above bedrock. Permeability is moderate. Surface runoff is rapid or very rapid. The available water capacity is moderate. Bedrock is at a depth of 20 to 40 inches. If the soil has not been limed, reaction is extremely acid to strongly acid.

A few areas of the soils in this map unit are used for farming, but most areas are idle or are forest.

These soils are not suited to cultivated crops. Some areas, where slopes are less than 25 percent, can produce a limited amount of hay or pasture. Slope, rock outcrops, and rock fragments on the surface or in the soil interfere with farming operations. The growing season is several weeks shorter than in parts of the county at lower elevations. Droughtiness is commonly a problem during dry periods in summer. Stocking rates within carrying capacity prevent overgrazing and help to control erosion.

Potential productivity of sugar maple on these soils is moderate. Rooting depth is severely restricted in the Hawksnest soil. Slope and rock outcrops interfere with machine planting. On both soils, equipment limitation is moderate. On the Hawksnest soil, the windthrow hazard is moderate and seedling mortality is severe.

Slope, depth to bedrock, and included areas of rock outcrops are severe limitations to use of these soils for building site development and as sites for sanitary facilities.

These soils are in capability subclass VIIs.

HeF—Hawksnest-Mongaup-Rock outcrop complex, very steep. This map unit consists of very steep soils and areas of Rock outcrop. It is about 30 percent Hawksnest soil, 30 percent Mongaup soil, 25 percent Rock outcrop, and 15 percent other soils. The Hawksnest soil is shallow and somewhat excessively drained or well drained. The Mongaup soil is moderately

deep and well drained or moderately well drained. These soils are on mountainsides in the Catskill Mountains. Slope ranges from 35 to about 70 percent Areas of the soils are long and narrow and range from about 5 to 75 acres or more. The Hawksnest and Mongaup soils and areas of Rock outcrop are in such an intricate pattern that they could not be mapped separately at the scale selected for mapping. Narrow, clifflike escarpments of sandstone and bedrock give many areas the appearance of stairsteps.

Typically, the surface layer of the Hawksnest soil is covered with a layer of rotted leaves and twigs. The surface layer is dark reddish brown loam about 1 inch thick. The subsurface layer is reddish gray channery loam to a depth of about 5 inches. The subsoil consists of layers of dark reddish brown loam and brown and dark reddish brown silt loam. Hard, grayish brown sandstone bedrock is at a depth of 16 inches.

Typically, the surface layer of the Mongaup soil is dark reddish brown loam about 3 inches thick. The subsoil is yellowish red and strong brown gravelly loam and brown sandy loam. Hard, grayish brown sandstone bedrock is at a depth of 22 inches.

Included with this unit in mapping are areas of very deep, well drained Elka and Lewbeach soils on the lower parts of hillsides. Also included are common small areas of very shallow soils that are similar to the Hawksnest soil but that are less than 10 inches deep over bedrock. Also included are some areas of very stony or bouldery soils. The included soils range from about 1 to 5 acres in size.

The seasonal high water table in the Hawksnest soil is perched above bedrock for brief periods in spring but is usually below bedrock. Permeability, or rate of water movement through the soil, is moderate in the surface layer and moderate or moderately rapid below. Surface runoff is very rapid. Available water capacity is low or very low. Bedrock is at a depth of 10 to 20 inches. If the soil has not been limed, reaction is extremely acid to strongly acid.

The seasonal high water table in the Mongaup soil is usually not perched above bedrock. Permeability is moderate. Surface runoff is very rapid. The available water capacity is moderate. Bedrock is at a depth of 20 to 40 inches. If the soil has not been limed, reaction is extremely acid to strongly acid.

In most areas the soils in this map unit are woodland. They are not suited to agriculture because of very steep slope, the shallow Hawksnest soil, and areas of rock outcrop.

Potential productivity of sugar maple on these soils is moderate. Rooting depth is severely restricted in the Hawksnest soil and in areas of the included, very shallow soils. On both soils, equipment limitation is severe and erosion is a moderate hazard. Also, on the Hawksnest soil, seedling mortality is severe and the windthrow hazard is moderate.

Slope, rock outcrops, and, on the Hawksnest soil, shallowness to bedrock are severe limitations to use of this soil for building site development and as sites for sanitary facilities.

These soils are in capability subclass VIIs.

LaB—Lackawanna channery loam, 3 to 8 percent slopes. This is a very deep, gently sloping, well drained soil on hilltops and plateaus on uplands. Slopes are smooth and slightly convex. Areas of the soil are oval or irregular in shape and range from 3 to 25 acres in size.

Typically, the surface layer is covered with black organic litter about 2 inches thick. The surface layer is brown channery loam about 3 inches thick. The subsoil in the upper part, to a depth of about 32 inches, is reddish brown channery loam. In the lower part it is dense, compact, reddish brown channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Oquaga, Cheshire, Wellsboro, and Morris soils. Lackawanna soils are deeper than Oquaga soils and have fewer rock fragments. Unlike Cheshire soils, Lackawanna soils have a dense subsoil. Lackawanna soils are better drained and are in higher positions on the landscape than Wellsboro and Morris soils. Also included are the sandier Swartswood and Wurtsboro soils. Lackawanna soils are better drained than Wurtsboro soils. Also included are small areas of very stony or bouldery soils that are indicated on the soil map by special symbols. The included soils make up about 20 percent of the map unit.

The seasonal high water table in this Lackawanna soil is at a depth of 2.5 to 6 feet in winter and early spring. Depth to bedrock is more than 60 inches. Permeability is moderate above the dense fragipan and slow in the fragipan and the substratum. Surface runoff is slow or medium. The available water capacity is moderate. If the soil has not been limed, the surface layer and the subsoil are strongly acid to extremely acid.

Many areas of this soil are used for farming. Some areas are used for community development. Some areas are covered with brush or nonwoody plants or are forest.

This soil is well suited to most crops grown in the region. It is among the soils in the county that are best suited to food and fiber production. Erosion is a slight

hazard if, in intensive cropping, the soil is not properly managed. Cover crops, conservation tillage, and crop residue use help to control erosion and to maintain organic matter content and soil tilth.

Potential productivity of northern red oak on this soil is moderately high. There are no limitations to woodland use and management.

The limitations of this soil are slight as sites for dwellings without basements and small commercial buildings. The seasonal high water table is a moderate limitation on sites for dwellings with basements. The dense subsoil is a severe limitation on sites for septic tank absorption fields. The seasonal high water table, slope, the erosion hazard, and moderate potential frost action are also limitations for intensive development. During construction, minimum site disturbance and temporary cover crops help to control erosion.

This soil is in capability subclass IIe.

LaC—Lackawanna channery loam, 8 to 15 percent slopes. This is a very deep, strongly sloping, well drained soil on hillsides on uplands. Slopes are smooth and slightly convex. Areas of the soil are oval or irregular in shape and range from 3 to 25 acres in size.

Typically, the surface is black organic litter about 2 inches thick. The surface layer is brown channery loam about 3 inches thick. The subsoil in the upper part, to a depth of about 32 inches, is reddish brown channery loam. In the lower part it is dense, compact, reddish brown channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Oquaga, Cheshire, Wellsboro, and Morris soils. Lackawanna soils are deeper than Oquaga soils and have fewer rock fragments. Unlike Cheshire soils, they have a dense subsoil. Lackawanna soils are better drained and are in higher positions on the landscape than Wellsboro and Morris soils. Also included are sandier Swartswood and Wurtsboro soils. Lackawanna soils are better drained than Wurtsboro soils. Also included are small areas of very stony or bouldery soils that are indicated on the soil map by special symbols. The included soils make up about 15 percent of the map unit.

The seasonal high water table in this Lackawanna soil is at a depth of 2.5 to 6 feet in winter and early spring. Depth to bedrock is more than 60 inches. Permeability is moderate above the dense fragipan and slow in the fragipan and the substratum. Surface runoff is medium. The available water capacity is moderate. If the soil has not been limed, the surface layer and the subsoil are strongly acid to extremely acid.

Many areas of this soil are used for farming (fig. 10). Some areas are used for community development. Some areas are covered with brush or nonwoody plants or are forest.

This soil is moderately suited to cultivated crops. Erosion is a moderate hazard. Slope is a limitation. In some areas diversions or terraces are needed to help reduce runoff and control erosion. Conservation tillage and cover crops also help to control erosion and to maintain productivity. On pasture, stocking rates within carrying capacity prevent overgrazing and help to maintain needed sod cover.

Potential productivity of northern red oak on this soil is moderately high. There are few or no limitations to woodland use and management.

Slope, potential frost action, and the seasonal high water table are moderate or severe limitations to use of this soil for building site development. Slow permeability is a severe limitation on sites for septic tank absorption fields. During construction, minimum site disturbance and temporary cover crops help to control erosion.

This soil is in capability subclass IIIe.

LaD—Lackawanna channery loam, 15 to 25 percent slopes. This is a very deep, moderately steep, well drained soil on hillsides on uplands. Slopes are smooth and slightly convex. Areas of the soil are oval or irregular in shape and range from 3 to 25 acres in size.

Typically, the surface layer is covered with black organic litter about 2 inches thick. The surface layer is brown channery loam about 3 inches thick. The subsoil in the upper part, to a depth of about 32 inches, is reddish brown channery loam. In the lower part it is dense, compact, reddish brown channery loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Oquaga, Cheshire, Wellsboro, and Morris soils. Lackawanna soils are deeper than Oquaga soils and have fewer rock fragments. Unlike Cheshire soils, they have a dense subsoil. Lackawanna soils are better drained and are in higher positions on the landscape than Wellsboro and Morris soils. Also included are sandier Swartswood and Wurtsboro soils. Lackawanna soils are better drained than Wurtsboro soils. Also included are small areas of very stony or bouldery soils that are indicated on the soil map by special symbols. The included soils make up about 15 percent of the map unit.

The seasonal high water table in this Lackawanna soil is at a depth of 2.5 to 6 feet in winter and early spring. Depth of bedrock is more than 60 inches. Permeability is moderate above the dense fragipan and slow in the fragipan and the substratum. Surface runoff

Figure 10.—Lackawanna channery loam, 8 to 15 percent slopes, is commonly used for hay and pasture. The shallow Arnot soils and moderately deep Oquaga soils are on most of the wooded hilltops.

is medium. The available water capacity is moderate. If the soil has not been limed the surface layer and the subsoil are strongly acid to extremely acid.

Some areas of this soil are used for farming. Other areas are covered with brush or nonwoody plants or are forest.

This soil is poorly suited to cultivated crops. Slope is a limitation. The soil is better suited to hay or pasture, although slope limits use of farm machinery. Stocking rates within carrying capacity prevent overgrazing and help to maintain needed sod cover.

Potential productivity of northern red oak on this soil is moderately high. The equipment limitation is moderate because of slope.

Slope is a severe limitation to use of this soil for building site development. Slope and slow permeability are severe limitations on sites for sanitary facilities. The erosion hazard is moderate or severe if the cover of the soil is disturbed.

This soil is in capability subclass IVe.

LeB—Lewbeach silt loam, 3 to 8 percent slopes. This is a very deep, gently sloping, well drained soil on mountaintops and plateaus of the Catskill Mountains in the northern part of the county. Slopes are smooth and slightly convex. Areas of this soil are oval or irregular in shape and range from 3 to 25 acres in size.

Typically, the surface layer is dark reddish brown silt loam about 3 inches thick. The subsurface layer is dark reddish gray silt loam about 5 inches thick. The subsoil in the upper part, to a depth of about 33 inches, is yellowish red and light reddish brown gravelly loam and gravelly sandy loam. In the lower part it is compact, dense, reddish brown gravelly sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of well drained, moderately deep Mongaup soils and very deep, well drained Elka soils. In lower parts of the landscape are small areas of very deep, moderately well drained Willowemoc soils and somewhat poorly drained Onteora soils. Also included are small areas of stony or bouldery soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Lewbeach soil is at a depth of 2 to 4 feet in winter and early spring. Depth to bedrock is more than 5 feet. Permeability is moderate or moderately slow above the dense fragipan and slow or very slow in the fragipan. Surface runoff is slow or medium. The available water capacity is moderate. If the soil has not been limed, reaction is very strongly acid or strongly acid above the fragipan and very strongly acid to moderately acid in the fragipan.

A few areas of this soil are used for farming, but most areas are forest or are idle.

This soil is well suited to cultivated crops. In most years the growing season is usually several weeks shorter than in parts of the county at lower elevations. It is among the soils in the county that are best suited to food and fiber production. Selecting short-season plants is a suitable management practice. Cover crops and contour tillage or conservation tillage are commonly needed to help to control erosion. Stocking rates within carrying capacity prevent overgrazing and help to control erosion.

Potential productivity of sugar maple on this soil is moderately high. There are few or more limitations to woodland use and management.

The seasonal high water table is a moderate limitation to use of this soil as sites for dwellings without basements. The seasonal high water table, slow permeability, slope, the erosion hazard, and moderate potential frost action are severe limitations on sites for septic tank absorption fields.

This soil is in capability subclass IIe.

LeC—Lewbeach silt loam, 8 to 15 percent slopes. This is a very deep, strongly sloping, well drained soil on mountainsides of the Catskill Mountains in the northern part of the county. Slopes are smooth and slightly convex. Areas of the soil are oval or irregular in shape, and range from 3 to 25 acres in size.

Typically, the surface layer is dark reddish brown silt loam about 3 inches thick. The subsurface layer is dark reddish gray silt loam about 5 inches thick. The subsoil in the lower part, to a depth of about 33 inches, is yellowish red and light reddish brown gravelly loam and gravelly sandy loam. In the lower part, to a depth of 60 inches or more, it is dense, compact, reddish brown gravelly sandy loam.

Included with this soil in mapping are small areas of well drained, moderately deep Mongaup soils and very deep Elka soils. Also included, in the lower parts of the landscape, are small areas of very deep, moderately well drained Willowemoc soils and somewhat poorly drained Onteora soils. Small areas of stony or bouldery soils are common. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Lewbeach soil is at a depth of 2 to 4 feet in winter and early spring. Depth to bedrock is more than 60 inches. Permeability is moderate or moderately slow above the dense fragipan and slow or very slow in the fragipan. Surface runoff is medium or rapid. The available water capacity is moderate. If the soil has not been limed, reaction is very strongly acid or strongly acid above the fragipan and very strongly acid to moderately acid in the fragipan.

Most areas of this soil are forest or idle. A few areas are used for farming.

This soil is moderately suited to cultivated crops, but in most years the growing season is several weeks shorter than it is in parts of the county at lower elevations. Selecting short-season plant varieties is a suitable management practice. Slope and the erosion hazard also limit intensive cultivation. Cover crops, contour farming, conservation tillage, and diversions help to reduce runoff and to control erosion. On pasture, stocking rates within carrying capacity prevent overgrazing and help to maintain a permanent sod cover and to control erosion.

Potential productivity of sugar maple on this soil is moderate. There are no limitations to woodland use and management.

The seasonal high water table and slope are moderate limitations to use of this soil as sites for dwellings without basements. The seasonal high water table are severe limitations on sites for dwellings with basements. The seasonal high water table and slow permeability are severe limitations on s tes for septic tank absorption fields. The seasonal high water table, slope, the erosion hazard, and moderate potential frost action also hinder building site development. During construction, minimum site disturbance and temporary cover crops help to control erosion.

This soil is in capability subclass IIIe.

LeD—Lewbeach silt loam, 15 to 25 percent slopes. This is a very deep, moderately steep, well drained soil on mountainsides of the Catskill Mountains in the northern part of the county. Slopes are smooth and slightly convex. Areas of this soil are mostly long and relatively narrow, and range from about 3 to 30 acres in size.

Typically, the surface layer is dark reddish brown silt loam about 3 inches thick. The subsurface layer is dark reddish gray silt loam about 5 inches thick. The subsoil in the lower part, to a depth of about 33 inches, is yellowish red and light reddish brown gravelly loam and gravelly sandy loam. In the lower part, to a depth of 60 inches or more, it is dense, compact, reddish brown gravelly sandy loam.

Included with this soil in mapping are small areas of well drained, moderately deep Mongaup soils and very deep Elka soils. Also included, in the lower parts of the landscape, are small areas of very deep, moderately well drained Willowemoc soils and somewhat poorly drained Onteora soils. Small areas of stony or bouldery soils are common. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Lewbeach soil is at a depth of 2 to 4 feet in winter and early spring. Depth to bedrock is more than 60 inches. Permeability is moderate or moderately slow above the dense fragipan and slow or very slow in the fragipan. Surface runoff is rapid. The available water capacity is moderate. If the soil has not been limed, reaction is very strongly acid or strongly acid above the fragipan and very strongly acid to moderately acid in the fragipan.

Most areas of this soil are forest or idle. A few small areas are used for farming.

This soil is poorly suited to cultivated crops. The main limitations are slope and the erosion hazard. The growing season is several weeks shorter than in parts of the county at lower elevations. Selecting short-season plant varieties is a suitable management practice. Extensive measures to control both erosion and runoff are needed if the soil is cultivated. The soil is better suited to hay or pasture, but slope limits the use of farm machinery. Stocking rates within carrying capacity prevent overgrazing and help to maintain needed sod cover.

Potential productivity of sugar maple on this soil is moderate. Slope is a moderate limitation to use of equipment.

Slope, the seasonal high water table, and slow permeability in the subsoil are severe limitations of this soil for building site development and as sites for sanitary facilities. The erosion hazard is moderate or severe if the vegetative cover of the soil is disturbed.

This soil is in capability subclass IVe.

LfE—Lewbeach silt loam, steep, very stony. This is a very deep, moderately steep and steep, well drained soil on mountainsides of the Catskill Mountains. Slopes are mostly smooth and slightly convex, and range from 15 to 35 percent. Stones and boulders more than 10 inches in diameter and about 5 to 30 feet apart cover 3 to 15 percent of the surface. Areas of the soil are long and relatively narrow, and range from 3 to 40 acres or more in size.

Typically, the surface layer is dark reddish brown silt loam about 3 inches thick. The subsurface layer is dark reddish gray silt loam about 5 inches thick. The subsoil in the lower part, to a depth of about 33 inches, is yellowish red and light reddish brown gravelly loam and gravelly sandy loam. In the lower part, to a depth of 60 inches or more, it is dense, compact, reddish brown gravelly sandy loam.

Included with this soil in mapping are small areas of well drained, moderately deep Mongaup soils and very deep Elka soils. Also included, in the flatter areas, are small areas of very deep, moderately well drained Willowemoc soils. Also included are small areas of soils that do not have stones or boulders. The included soils range to 5 acres in size and make up about 20 percent of the map unit.

The seasonal high water table in this Lewbeach soil is at a depth of 2 to 4 feet in winter and early spring. Depth to bedrock is more than 60 inches. Permeability is moderate or moderately slow above the dense fragipan and slow or very slow in the fragipan. Surface runoff is rapid or very rapid. The available water capacity is moderate. If the soil has not been limed, reaction is very strongly acid or strongly acid above the fragipan and very strongly acid to moderately acid in the fragipan.

Most areas of this soil are forest. A few small areas are idle.

This soil is not suited to cultivated crops because of slope and stones or boulders scattered on the surface. In most areas, where slope is less than 25 percent, the soil can produce a limited amount of pasture. Grazing time, however, must be controlled to prevent destruction of the sod cover and to control erosion. The growing season is several weeks shorter than it is in other parts of the county at lower elevations. Stones and steep slopes hinder practices needed to improve pasture.

Potential productivity of sugar maple on this soil is moderate. Slope is a moderate limitation to use of equipment. Stones also interfere with replanting.

Slope, the seasonal high water table, and slow permeability in the dense subsoil are severe limitations to use of this soil as sites for sanitary facilities and for building site development. Stones also hinder development.

Potential of this soil is good as habitat for certain types of wildlife.

This soil is in capability subclass VIIs.

LfF—Lewbeach silt loam, very steep, very stony. This is a very deep, very steep, well drained soil on mountainsides in the Catskill Mountains. Slopes are mostly smooth and range from 35 to 50 percent. Stones and boulders more than 10 inches in diameter and about 5 to 30 feet apart cover 3 to 15 percent of the surface. Areas of the soil are long and relatively narrow, and range from 3 to 20 acres in size.

Typically, the surface layer is dark reddish brown silt loam about 3 inches thick. The subsurface layer is dark reddish gray silt loam about 5 inches thick. The subsoil in the upper part is yellowish red and light reddish brown gravelly loam and gravelly sandy loam to a depth of about 33 inches. In the lower part, to a depth of 60 inches or more, it is compact, dense, reddish brown gravelly sandy loam.

Included with this soil in mapping are small areas of well drained, moderately deep Mongaup soils and very deep Elka soils. Also included, in flatter areas, are small areas of very deep, moderately well drained Willowemoc soils. Also included are small areas of soils that do not have stones and boulders. The included soils range to 5 acres in size and make up about 20 percent of the map unit.

The seasonal high water table in this Lewbeach soil is at a depth of 2 to 4 feet in winter and early spring. Depth to bedrock is more than 60 inches. Permeability is moderate or moderately slow above the dense fragipan layer and slow or very slow in the fragipan. Surface runoff is very rapid. The available water holding capacity is moderate. If the soil has not been limed, reaction is very strongly acid or strongly acid above the fragipan and very strongly acid to moderately acid in the fragipan.

Most areas of this soil are forest, but a few small areas are idle. The soil is not suited to farming because of slope and scattered stones or boulders. The growing season is several weeks shorter than in parts of the county at lower elevations.

Potential productivity of sugar maple on this soil is moderate. Slope is a severe limitation to use of equipment. Erosion is a moderate hazard. Also, stones interfere with replanting.

Slope, the seasonal high water table, and slow or very slow permeability in the fragipan are severe limitations to use of this soil as sites for sanitary facilities and for building site development. Stones also hinder development.

Potential of this soil is good as habitat for certain types of wildlife.

This soil is in capability subclass VIIs.

LoB—Lordstown silt loam, 3 to 8 percent slopes, stony. This is a moderately deep, gently sloping, well drained soil on hilltops on bedrock-controlled uplands. Stones larger than 10 inches in diameter and about 25 to 75 feet apart cover 0.01 to 0.1 percent of the surface. Slopes are smooth and slightly convex. Areas are oblong or irregular in shape and range from about 3 to 20 acres in size.

Typically, the surface layer is covered with mostly black organic litter about 3 inches thick. The surface layer is brown silt loam about 3 inches thick. The subsoil is dark brown and brown channery loam about 22 inches thick. Hard, gray sandstone bedrock is at a depth of 25 inches.

Included with this soil in mapping are small areas of shallow Arnot soils and very deep Swartswood, Wurtsboro, Valois, Lackawanna, and Wellsboro soils. Also included are small areas of shallower, wetter Tuller soils and moderately well drained, similar soils. Also included are a few small areas of very stony or bouldery soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Lordstown soil is normally not present above the bedrock. Permeability, or rate of water movement through the soil, is moderate. Surface runoff is medium. The available water capacity is moderate. Bedrock is at a depth of 20 to 40 inches. Reaction ranges from slightly acid to very strongly acid.

Most areas of this soil are idle or forest. A few areas are used for farming.

This soil is well suited to cultivated crops, but surface stones hinder tillage and cause greater than normal wear of machinery. The soil is among the soils in the county that are considered best suited to food and fiber production. Erosion is a slight hazard. Conservation tillage and contour farming help to control erosion. Cover crops, crop residue use, and regular additions of organic matter help to improve soil tilth. The soil is well suited to pasture and hay, although in some places the surface stones interfere with farm operations. Stocking rates within carrying capacity and restricted grazing help to maintain a permanent sod cover and to control erosion.

Potential productivity of northern red oak on this soil is moderately high. There are no limitations to woodland use and management. In some areas stones interfere with machine planting.

Bedrock between depths of 20 and 40 inches is the main limitation to use of this soil for building sites and other urban uses.

This soil is in capability subclass IIe.

LrC—Lordstown-Arnot complex, 8 to 15 percent slopes, very stony. This map unit consists of strongly sloping soils on hillsides on bedrock-controlled uplands. It is about 55 percent Lordstown soil, 25 percent Arnot soil, and 20 percent other soils. The Lordstown soil is moderately deep and well drained. The Arnot soil is shallow and well drained or somewhat excessively drained. Areas of these soils are oblong or irregular in shape and range from about 3 to 25 acres in size. The Lordstown and Arnot soils are in such an intricate pattern that they could not be mapped separately at the scale selected for mapping. Stones larger than 10 inches in diameter cover 3 to 10 percent of the surface.

Typically, the surface layer of the Lordstown soil is covered with mostly black organic litter about 3 inches thick. The surface layer is brown silt loam about 3 inches thick. The subsoil is dark brown and brown channery loam about 22 inches thick. Hard, gray sandstone bedrock is at a depth of 25 inches.

Typically, the surface layer of the Arnot soil is covered by a thin layer of decomposed leaves and twigs. The surface layer is dark brown channery loam about 2 inches thick. The subsoil is brownish yellow and yellowish brown very channery loam about 14 inches thick. Hard, light gray sandstone bedrock is at a depth of 16 inches.

Included with this unit in mapping are small areas of very deep Swartswood, Wurtsboro, Valois, Lackawanna, and Wellsboro soils. Also included are areas of soils where bedrock is at a depth of 40 to 60 inches, small areas of stony or bouldery soils, and scattered areas of rock outcrops. The included soils and areas of rock outcrops range from about 0.1 to 3 acres in size.

The seasonal high water table in the Lordstown soil is usually not above bedrock. Permeability, or rate of water movement through the soil, is moderate. Surface runoff is medium. The available water capacity is moderate. Bedrock is at a depth of 20 to 40 inches. If the soil has not been limed, it ranges from very strongly acid to slightly acid.

The seasonal high water table in the Arnot soil is perched above bedrock for brief periods in spring, but usually it is not above bedrock. Permeability is moderate. Surface runoff is rapid. The available water capacity is low or very low. Bedrock is at a depth of 10 to 20 inches. If the soil has not been limed, it ranges from extremely acid to moderately acid.

Most areas of the soils in this map unit are forest or covered with brush and nonwoody plants. A few areas are used for farming.

These soils are not suited to cultivated crops because of slope, surface stoniness, and, on the Arnot soil, shallowness to bedrock. In a few areas they can be used for hay or pasture, but stones interfere with farm operations. Droughtiness is likely a problem during dry periods in summer. Controlled pasture reseeding and deferred grazing help to maintain a permanent sod cover and to control erosion.

Potential productivity of northern red oak on these soils is moderate. On the Arnot soil, windthrow is a moderate hazard because rooting depth is severely restricted, and seedling mortality is severe.

Shallow depth to bedrock in the Arnot soil and moderate depth in the Lordstown soil are severe limitations to use of these soils for most urban uses.

These soils are in capability subclass VIs.

MaB—Manlius channery silt loam, 3 to 8 percent slopes. This is a moderately deep, gently sloping, well drained to excessively drained soil on hilltops and benches on bedrock-controlled, glaciated uplands. The soil is east of the Shawangunk Mountains in the southeast part of the county. Slopes are smooth and commonly slightly convex. Areas of this soil are irregular in shape or oval. They are commonly 5 to 10 acres in size, but range from 3 to 20 acres.

Typically, the surface layer is very dark grayish brown channery silt loam about 2 inches thick. The subsoil, to a depth of about 22 inches, is dark yellowish brown and yellowish brown channery and very channery

silt loam. The substratum to a depth of about 27 inches is yellowish brown very channery silt loam. Fractured shale bedrock is at a depth of 27 inches.

Included with this soil in mapping are small areas of shallower Arnot soils on hilltops and Mardin, Swartswood, and Wurtsboro soils in areas where glacial till is deeper. Also included are small areas of Tuller soils. Tuller soils are shallower and wetter than the Manlius soil. Mardin, Swartswood, and Wurtsboro soils are very deep and have a fragipan. Also included are areas of soils that have bedrock at a depth of 40 to 60 inches. The included soils range to 3 acres in size and make up about 15 to 20 percent of the map unit.

The seasonal high water table in the Manlius soil is not usually above bedrock. Permeability is moderate. Surface runoff is medium. The available water capacity is low. Shale fragments interfere with some tillage operations. The soil is droughty during midsummer dry spells. If the soil has not been limed, the surface layer and the subsoil are extremely acid to strongly acid. Depth to bedrock ranges from 20 to 40 inches.

Most areas of this soil are woodland or are covered with brush or nonwoody plants. A few areas are used for farming or urban development.

This soil is well suited to cultivated crops, but in some areas shale fragments interfere with some tillage operations. Droughtiness is likely to reduce yields in dry years. Erosion is a moderate hazard. Conservation tillage, stripcropping, and contour farming help to control erosion. Cover crops, crop residue use, and regular additions of organic material help to maintain soil tilth and to increase infiltration and moisture storage.

This soil is well suited to pasture and hay, but stocking rates within carrying capacity prevent overgrazing and help to control erosion.

Potential productivity of northern red oak on this soil is moderately high. There are few or no limitations to woodland use and management.

Bedrock at a depth of 20 to 40 inches is a severe limitation to use of this soil as sites for sanitary facilities. Depth to bedrock is a moderate limitation on sites for dwellings without basements. In most areas bedrock is rippable with heavy equipment. Potential frost action is moderate.

Rock fragments on the surface or in the soil are a moderate limitation to many recreation uses.

This soil is in capability subclass IIe.

MaC—Manlius channery silt loam, 8 to 15 percent slopes. This is a moderately deep, strongly sloping, well drained to excessively drained soil on hillsides on bedrock-controlled, glaciated uplands (fig. 11). It is east of the Shawangunk Mountains in the southeast part of the county. Slopes are smooth and commonly slightly convex. Areas of the soil are irregular in shape or oval. They are commonly 5 to 10 acres in size but range from 3 to 20 acres.

Typically, the surface layer is very dark grayish brown channery silt loam about 2 inches thick. The subsoil, to a depth of 22 inches, is dark yellowish brown and yellowish brown channery and very channery silt loam. The substratum, to a depth of about 27 inches, is yellowish brown very channery silt loam. Fractured shale bedrock is at a depth of 27 inches.

Included with this soil in mapping are small areas of shallower Arnot soils on hilltops and Mardin, Swartswood, and Wurtsboro soils in areas of deeper glacial till. Also included are small areas of Tuller soils. Tuller soils are shallower and wetter than Manlius soils. Mardin, Swartswood, and Wurtsboro soils are very deep and have a fragipan. Also included are soils that have bedrock at a depth of 40 to 60 inches. The included soils range to 3 acres in size, and make up 15 to 20 percent of the map unit.

The seasonal high water table in the Manlius soil is not usually above bedrock. Permeability is moderate. Surface runoff is medium. The available water capacity is low. Shale fragments interfere with some tillage operations. The soil is droughty during midsummer dry spells. If the soil has not been limed, the surface layer and the subsoil are extremely acid to strongly acid. Depth to bedrock ranges from 20 to 40 inches.

Most areas of this soil are wooded or are covered with brush or nonwoody plants. A few areas are used for farming or urban development.

This soil is moderately suited to cultivated crops, but slope limits intensive cropping. Shale fragments interfere with some tillage operations. Droughtiness likely reduces yields in dry years. Erosion is a moderate or severe hazard. Conservation tillage, cover crops, stripcropping, and contour farming help to control erosion. Crop residue use and regular additions of organic material help to improve soil tilth and to increase water infiltration and storage.

This soil is well suited to pasture and hay, but stocking rates within carrying capacity prevent overgrazing and help to control erosion.

Potential productivity of northern red oak on this soil is moderately high. There are few or no limitations to woodland use and management.

Depth to bedrock and slope are severe limitations to use of this soil as sites for sanitary facilities. Depth to bedrock is a moderate limitation for dwellings without

Figure 11.—Horizontal beds of dark shale and siltstone in the Shawangunk Mountains underlie the moderately deep Manlius channery silt loam, 8 to 15 percent slopes. Bedrock limits *excavating the soil* for road construction and homesites.

basements. Bedrock in most areas is rippable with heavy equipment. Potential frost action is moderate.

Slope and rock fragments on the surface or in the soil are limitations to many recreation uses.

This soil is in capability subclass IIIe.

MaD—Manlius channery silt loam, 15 to 25 percent slopes. This is a moderately deep, gently sloping, well

drained to excessively drained soil on hilltops and benches on bedrock-controlled, glaciated uplands. The soil is east of the Shawangunk Mountains in the southeast part of the county. Slopes are smooth and commonly slightly convex. Areas of this soil are irregular in shape or oval. They are commonly 5 to 10 acres in size, but range from 3 to 20 acres.

Typically, the surface layer is very dark grayish brown channery silt loam about 2 inches thick. The subsoil, to a depth of about 22 inches, is dark yellowish brown and yellowish brown channery and very channery silt loam. The substratum, to a depth of about 27 inches, is yellowish brown very channery silt loam. Fractured shale bedrock is at a depth of 27 inches.

Included with this soil in mapping are small areas of shallower Arnot soils on hilltops and Mardin, Swartswood, and Wurtsboro soils in areas where glacial till is at a greater depth. Mardin, Swartswood, and Wurtsboro soils are very deep soils that have a fragipan. Also included are areas of soils that have bedrock at a depth of 40 to 60 inches. The included soils range to 3 acres in size and make up about 15 to 20 percent of the map unit.

The seasonal high water table in this Manlius soil is not usually above bedrock. Permeability is moderate. Surface runoff is rapid. The available water capacity is low. The soil is droughty during midsummer dry spells. If the soil has not been limed, the surface layer and the subsoil are extremely acid to strongly acid. Depth to bedrock ranges from 20 to 40 inches.

Most areas of this soil are forest or are covered with brush and nonwoody plants.

This soil is poorly suited to cultivated crops because of slope and the hazard of severe erosion.

This soil is better suited to hay and pasture, but slope limits modern harvesting equipment. Suitable management practices are using stocking rates within carrying capacity to prevent overgrazing and to control erosion and selecting plants tolerant of some droughtiness.

Potential productivity of northern red oak on this soil is moderately high. Slope is a moderate limitation to use of equipment.

Slope and depth to bedrock are severe limitations to use of this soil as sites for sanitary facilities and for building site development. Bedrock is rippable with heavy equipment.

Slope is a serious limitation of this soil for most recreation uses.

This soil is in capability subclass IVe.

MdB—Mardin gravelly silt loam, 3 to 8 percent slopes. This is a very deep, gently sloping, moderately well drained soil in smooth or slightly concave areas on glacial till plains. Areas of the soil are irregular in shape or roughly oval and range from 5 to 15 acres in size.

Typically, the surface layer is very dark brown gravelly silt loam about 4 inches thick. The subsoil in the upper part, to a depth of about 20 inches, is dark brown and brownish yellow gravelly silt loam. In the lower part it is dense, compact, dark yellowish brown gravelly silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of well drained Chenango and Valois soils, which do not have a dense, compact layer. Also included, on wetter parts of the landscape, are small areas of somewhat poorly drained Scriba and Morris soils. Also included are small areas of moderately deep, well drained to excessively drained Manlius soils and shallow, well drained to somewhat excessively drained Arnot soils on hilltops. The included areas of stony soils and rock outcrops are indicated on the soil map by special symbols. The included areas range to 3 acres in size and make up 10 to 20 percent of the map unit.

The seasonal high water table in this Mardin soil is perched above the dense, firm subsoil layer for brief periods in spring. Permeability is moderate above the dense layer in the subsoil and slow or very slow in the dense layer in the subsoil and in the substratum. The available water capacity is moderate. Surface runoff is medium. Depth to bedrock is more than 60 inches. If the soil has not been limed, above the fragipan it ranges from extremely acid to moderately acid. In the fragipan the soil ranges from very strongly acid to slightly acid.

Small areas of this soil have been cleared and are used for crops. Other areas are used for urban development. Many areas have reverted to brush and forest.

This soil is well suited to most crops grown in the region. The seasonal high water table and included wet spots limit cultivation in early spring and during periods of wet weather. Drainage or diversions to intercept water from surrounding higher areas will improve crop response. Erosion is a hazard. Cover crops, cross-slope tillage, and return of crop residue to the soil help to control erosion and to improve the organic matter content and soil tilth. Also, rock fragments hinder some tillage operations and can cause excessive wear of machinery.

This soil is well suited to pasture and hay, but plant

varieties tolerant of some seasonal wetness are most productive. Restricted grazing during wet periods help to maintain a permanent sod cover.

Potential productivity of sugar maple on this soil is moderate. There are no limitations to woodland use and management.

The seasonal high water table and the dense, slowly permeable or very slowly permeable layer in the subsoil are severe limitations to use of this soil as sites for sanitary facilities. The seasonal high water table and slope are moderate limitations on sites for small commercial buildings and dwellings without basements. Foundation drainage is needed if the soil is used as sites for buildings.

This soil is in capability subclass IIw.

MdC—Mardin gravelly silt loam, 8 to 15 percent slopes. This is a very deep, strongly sloping, moderately well drained soil on smooth or slightly concave hillsides on uplands. Areas of the soil are irregular in shape or roughly oval and range from 5 to about 30 acres in size.

Typically, the surface layer is very dark brown gravelly silt loam about 4 inches thick. The subsoil in the upper part, to a depth of about 20 inches, is dark brown and brownish yellow gravelly silt loam. In the lower part it is dense, compact, dark yellowish brown gravelly silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of well drained Chenango and Valois soils, which do not have a dense, compact layer. Also included, on lower parts of the landscape, are small areas of somewhat poorly drained Scriba and Morris soils. Also included are small areas of moderately deep, well drained Manlius soils and shallow, well drained or somewhat excessively drained Arnot soils on hilltops. The included areas of moderately steep soils, stony soils, and rock outcrops are indicated on the soil map by conventional symbols. The included soils range to 3 acres in size and make up about 10 to 20 percent of the map unit.

The seasonal high water table in this Mardin soil is perched above the dense, firm subsoil layer for brief periods in spring. Permeability is moderate above the dense layer in the subsoil and slow or very slow in the dense layer in the subsoil and in the substratum. The available water capacity is moderate. Surface runoff is medium or rapid. Depth to bedrock is more than 60 inches. If the soil has not been limed, above the fragipan it ranges from extremely acid to moderately acid. In the fragipan the soil ranges from very strongly acid to slightly acid.

Small areas of this soil have been cleared and are used for hay or pasture. Other areas are used for urban development. Many areas have reverted to brush and forest.

This soil is moderately suited to most crops grown in the region. Slope and the seasonal high water table hinder farming operations. Drainage or diversions to keep water from surrounding higher areas off the soil will improve crop response and help to reduce runoff and to control erosion. Erosion is a hazard. Cover crops, conservation tillage, contour farming, and crop residue returned to the soil help to control erosion and to improve the organic matter content and soil tilth. Also, rock fragments hinder some tillage operations and can cause excessive wear of machinery.

This soil is well suited to pasture and hay, but plant varieties tolerant of some seasonal wetness are most productive. Restricted grazing during wet periods help to maintain a permanent sod cover and to control erosion.

Potential productivity of sugar maple on this soil is moderate. There are few or no limitations to woodland use and management. The seasonal high water table and the dense, slowly permeable or very slowly permeable layer in the subsoil are severe limitations to use of this soil as sites for sanitary facilities. The seasonal high water table and slope are moderate limitations for small commercial buildings and dwellings without basements.

This soil is in capability subclass IIIe.

MnB—Mongaup loam, 3 to 8 percent slopes, very stony. This is a moderately deep, gently sloping, well drained or moderately well drained soil on mountaintops and bedrock-controlled benches or small plateaus in the Catskill Mountains. Stones and boulders about 2 to 20 feet apart cover 3 to 15 percent of the surface. Slopes are smooth. Areas of the soil are irregular in shape or elongated, and range from 3 to 20 acres in size.

Typically, the surface layer is reddish brown loam about 3 inches thick. The subsoil is about 19 inches thick. It is yellowish red and strong brown gravelly loam in the upper part and brown sandy loam in the lower part. Hard, grayish brown sandstone bedrock is at a depth of 22 inches.

Included with this soil in mapping are small areas of shallow Hawksnest soils on hilltops. Also included, in the flatter parts of the landscape, are shallow, somewhat poorly drained or poorly drained Torull soils. Also included are areas of very deep Lewbeach and Elka soils. The included soils range to 3 acres in size and make up about 15 to 20 percent of the map unit.

The seasonal high water table in this Mongaup soil in

some areas is perched above bedrock for brief periods in spring, but is not usually above bedrock. Permeability, or rate of water movement through the soil, is moderate. Surface runoff is medium. The available water capacity is moderate. Bedrock, commonly sandstone, is at a depth of 20 to 40 inches. If the soil has not been limed, the surface layer and the subsoil range from extremely acid to strongly acid.

Most areas of this soil are idle or forest. A few small fields are used for pasture or hay.

This soil is not suited to cultivated crops because of surface stoniness. Some areas can provide limited pasture and hay, but stones interfere with farming operations. If used for pasture, stocking rates within carrying capacity and restricted grazing prevent overgrazing and help to maintain higher quality forage.

Potential productivity of sugar maple on this soil is moderate. Stones interfere with machine planting. There are no significant limitations to woodland use and management.

Hard bedrock at a depth of 20 to 40 inches is the main limitation of this soil for urban use. This is a severe limitation for sanitary facilities and dwellings with basements. It is a moderate limitation for dwellings without basements. Also, stones interfere with some urban or recreation uses.

This soil is in capability subclass VIs.

MnC—Mongaup loam, 8 to 15 percent slopes, very stony. This is a moderately deep, strongly sloping, well drained or moderately well drained soil on mountainsides and parts of bedrock-controlled benches in the Catskill Mountains. Stones or boulders about 2 to 20 feet apart cover 3 to 15 percent of the surface. Slopes are smooth. Areas of the soil are irregular in shape or elongated and range from 3 to 20 acres in size.

Typically, the surface layer is dark reddish brown loam about 3 inches thick. The subsoil is about 19 inches thick. It is yellowish red and strong brown gravelly loam in the upper part and brown gravelly sandy loam in the lower part. Hard, grayish brown sandstone bedrock is at a depth of 22 inches.

Included with this soil in mapping are small areas of shallow Hawksnest soils on hilltops. Also included, in the flatter parts of the landscape, are shallow, somewhat poorly drained or poorly drained Torull soils. Also included are areas of very deep Lewbeach and Elka soils. The included soils range to 3 acres in size and make up about 15 to 20 percent of the map unit.

The seasonal high water table in this Mongaup soil in a few areas is perched above bedrock for brief periods in spring, but is not usually above bedrock. Permeability, or the rate of water movement through the soil, is moderate. Surface runoff is medium or rapid. The available water capacity is moderate. Bedrock, commonly sandstone, is at a depth of 20 to 40 inches. If the soil has not been limed, the surface layer and the subsoil range from extremely acid to strongly acid.

Most areas of this soil are idle or forest. A few small fields are used for pasture or hay.

This soil is not suited to cultivated crops because of surface stoniness. Some areas can provide a limited amount of pasture and hay, but stones interfere with farming operations. If used for pasture, stocking rates within carrying capacity and restricted grazing prevent overgrazing and help to maintain higher quality forage. Erosion is a hazard if a good sod cover is not maintained.

The potential productivity of sugar maple on this soil is moderate. Stones interfere with machine planting. There are no significant limitations to woodland use and management.

Hard bedrock at a depth of 20 to 40 inches is the main limitation of this soil for urban use. This is a severe limitation for sanitary facilities and dwellings with basements. It is a moderate limitation for dwellings without basements. Also, stones interfere with some urban or recreation uses.

This soil is in capability subclass VIs.

MnD—Mongaup loam, 15 to 25 percent slopes, very stony. This is a moderately deep, moderately steep, well drained soil on mountainsides in the Catskill Mountains. Stones or boulders about 2 to 20 feet apart cover 3 to 15 percent of the surface. Slopes are smooth. Areas of the soil are irregular in shape or elongated and range from 3 to 20 acres in size.

Typically, the surface layer is dark reddish brown loam about 3 inches thick. The subsoil is about 19 inches thick. It is yellowish red and strong brown gravelly loam in the upper part and brown gravelly sandy loam in the lower part. Hard, grayish brown sandstone bedrock is at a depth of 22 inches.

Included with this soil in mapping are small areas of shallow Hawksnest soils on hilltops. Also included are very deep Lewbeach and Elka soils. The included soils range to 3 acres in size and make up about 15 to 20 percent of the map unit.

The seasonal high water table in this Mongaup soil is not usually above bedrock. Permeability, or rate of water movement through the soil, is moderate. Surface runoff is rapid. The available water capacity is moderate. Bedrock, commonly sandstone, is at a depth

of 20 to 40 inches. If the soil has not been limed, the surface layer and the subsoil range from extremely acid to strongly acid.

Most areas of this soil are idle or forest. A few small fields are used for pasture or hay.

This soil is not suited to cultivated crops because of surface stoniness. Some areas can provide limited pasture and hay, but stones and slope limit farming operations. If used for pasture, stocking rates within carrying capacity and restricted grazing prevent overgrazing and help to maintain higher quality forage. Erosion is a hazard if a good sod cover is not maintained.

Potential productivity of sugar maple on this soil is moderate. Stones interfere with machine planting. Slope is a moderate limitation to the use of equipment.

Hard bedrock at a depth of 20 to 40 inches is the main limitation of this soil for most urban uses. Also, stones and slope limit most urban and recreation uses.

This soil is in capability subclass VIs.

MrA—Morris loam, 0 to 3 percent slopes. This is a very deep, nearly level, somewhat poorly drained soil on till plains or parts of broad, flat hilltops on uplands. Areas of the soil are irregular in shape or oval and range from 3 to 15 acres in size.

Typically, the surface layer is dark brown loam about 2 inches thick. The subsurface layer is reddish gray loam about 4 inches thick. The subsoil is gravelly loam and extends to a depth of 60 inches or more. It is yellowish red and reddish gray in the upper part, reddish brown and weak red in the middle part, and dense, compact, and reddish brown in the lower part.

Included with this soil in mapping are small areas of better drained Wellsboro soils on higher parts of the landscape and wetter Alden soils in depressions. Also included, in parts of the survey area, are small areas of sandier Neversink and Scriba soils and better drained Wurtsboro soils. Also included are small areas of very stony or bouldery soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

Permeability of this Morris soil is moderate in the upper part and slow or very slow in the dense, firm layer in the subsoil fragipan. The seasonal high water table is perched above the fragipan from late fall to early spring. Surface runoff is slow. The available water capacity is moderate. Depth to bedrock is more than 60 inches. If the soil has not been limed, it is strongly acid to slightly acid.

Some areas of this soil are used for farming, mainly hay and pasture. Other areas are idle or forest.

The soil is moderately suited to cultivated crops. Unless the soil is drained, the seasonal high water table severely limits choice of crops and farming operations. Subsurface drains or open ditches are commonly needed, but in some areas suitable outlets are not available. In many areas diversions are also needed to intercept water from higher areas.

This soil is well suited to pasture and hay, but water-tolerant plants are more productive. Restricted grazing during wet periods helps to prevent destruction of the sod cover.

Potential productivity of northern red oak on this soil is moderate. The equipment limitation, seedling mortality, and windthrow hazard are moderate because of the seasonal high water table. Planting water-tolerant trees is a suitable management practice.

The seasonal high water table, the dense, slowly or very slowly permeable soil, and high potential frost action are severe limitations to use of this soil for building site development and as sites for sanitary facilities.

This soil is in capability class IIIw.

MrB—Morris loam, 3 to 8 percent slopes. This is a very deep, gently sloping, somewhat poorly drained soil on the lower parts of concave hillsides on uplands. Areas of the soil are irregular in shape or oval and range from about 3 to 25 acres in size.

Typically, the surface layer is dark brown loam about 2 inches thick. The subsurface layer is reddish gray loam about 4 inches thick. The subsoil is gravelly loam and extends to a depth of more than 60 inches. It is yellowish red and reddish gray in the upper part, reddish brown and weak red in the middle part, and dense, compact, and reddish brown in the lower part.

Included with this soil in mapping are small areas of better drained Wellsboro soils on higher parts of the landscape and wetter Alden soils in depressions. Also included, in parts of the survey area, are small areas of sandier Neversink and Scriba soils and better drained Wurtsboro soils. Also included are small areas of very stony or bouldery soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

Permeability of this Morris soil is moderate in the upper part and slow or very slow in the dense, firm layer, or fragipan, in the subsoil. The seasonal high water table is perched above the fragipan from late fall to early spring. Surface runoff is slow or medium. The available water capacity is moderate. Depth to bedrock is more than 60 inches. If the soil has not been limed, it is strongly acid to slightly acid.

Some areas of this soil are used for farming, mainly for hay and pasture. Other areas are idle or forest.

This soil is moderately suited to cultivated crops. Unless the soil is drained, the seasonal high water table severely limits choice of crops and farming operations. Subsurface drains or open ditches are commonly needed. In many areas diversions are also needed to intercept water from higher areas. Also, erosion is a hazard. Conservation tillage and contour farming help to control erosion.

This soil is well suited to pasture and hay, but water-tolerant plants are more productive. Restricted grazing during wet periods helps to prevent destruction of the sod cover.

Potential productivity of northern red oak on this soil is moderate. The equipment limitation, seedling mortality, and windthrow hazard are moderate because of the seasonal high water table. Planting water-tolerant trees is a suitable management practice.

The seasonal high water table, the dense, slowly or very slowly permeable subsoil, and high potential frost action are severe limitations of this soil for most urban uses.

This soil is in capability subclass IIIw.

MrC—Morris loam, 8 to 15 percent slopes. This is a very deep, strongly sloping, somewhat poorly drained soil on the lower parts of hillsides on uplands. Areas of the soil are irregular in shape or oval and range from about 3 to 30 acres in size.

Typically, the surface layer is dark brown loam about 2 inches thick. The subsurface layer is reddish grey loam about 4 inches thick. The subsoil is gravelly loam and extends to a depth of more than 60 inches. It is yellowish red and reddish gray in the upper part, reddish brown and weak red in the middle part, and dense, compact, and reddish brown in the lower part.

Included with this soil in mapping are small areas of better drained Wellsboro and Lackawanna soils. Also included, in parts of the survey area, are small areas of sandier Scriba soils and better drained Wurtsboro soils. Also included are small areas of very stony or bouldery soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

Permeability of this Morris soil is moderate in the upper part and slow or very slow in the dense layer, or fragipan, in the subsoil. The seasonal high water table is perched above the fragipan from late fall to early spring. Surface runoff is medium. The available water capacity is moderate. Depth to bedrock is more than 60 inches. If the soil has not been limed, it is strongly acid to slightly acid.

Some areas of this soil are used for farming, mainly for hay and pasture. Other areas are idle or forest.

This soil is moderately suited to cultivated crops. The seasonal high water table limits choice of crops and hinders farming operations. Erosion is a moderate hazard. In some areas subsurface drains or open ditches are needed. Diversions are also needed to intercept water from higher areas and to help reduce runoff and to control erosion. Conservation tillage and cover crops will also help to maintain productivity and to control erosion.

This soil is suited to pasture and hay. Selecting water-tolerant forage plants for seeding mixtures is a suitable management practice. Stocking rates within carrying capacity and restricted grazing during wet periods help to maintain a permanent sod cover and to control erosion.

Potential productivity of northern red oak on this soil is moderate. The equipment limitation, seedling mortality, and windthrow hazard are moderate because of the seasonal high water table. Planting water-tolerant trees is a suitable management practice.

The seasonal high water table, the dense, slowly or very slowly permeable subsoil, high potential frost action, and slope are severe limitations of this soil for most urban uses.

This soil is in capability subclass IIIe.

Ne—Neversink loam. This is a very deep, nearly level, poorly drained or very poorly drained soil in flat or slightly depressed areas of glacial till plains or along small drainageways. Areas of the soil are smooth or slightly concave. They are irregular in shape or oval and range from 3 to 30 acres in size. Slope ranges from 0 to 3 percent.

Typically, the surface layer is dark brown loam about 3 inches thick. The subsurface layer is grayish brown loam about 2 inches thick. The subsoil, to a depth of 21 inches, is reddish gray gravelly loam and brown gravelly fine sandy loam. The substratum, to a depth of 60 inches or more, is reddish brown gravelly sandy loam.

Included with this soil in mapping are small areas of better drained Scriba and Wurtsboro soils. Also included, in parts of the survey area, are small areas of siltier, better drained Wellsboro, Morris, and Wallington soils. Also included are some areas of gently sloping soils or soils that have a mucky, very stony, or extremely stony surface layer. Also included are very poorly drained Alden soils. The included soils range to 3 acres in size and make up about 10 to 20 percent of the map unit.

Permeability of this Neversink soil is moderate in the

surface and subsurface layers and slow in the subsoil and the substratum. Surface runoff is slow or very slow. The seasonal high water table is at or near the surface from late fall to midspring. The available water capacity is moderate. If the soil has not been limed, the surface layer and the subsoil are extremely acid to strongly acid. Depth to bedrock is 60 inches or more.

Some areas of this soil are used for pasture. Most areas are woodland or are covered with brush and native, nonwoody plants.

Unless extensive drainage is installed, this soil is too wet for cultivated crops or for high quality forage production. Outlets are commonly difficult to establish on this soil because of its low-lying position. The soil can provide a limited amount of pasture. The main concerns in pasture management are grazing the pasture when the soil is too wet and overgrazing.

Potential productivity of red maple on this soil is moderate. Erosion is a slight hazard. The equipment limitation, seedling mortality, and windthrow hazard are all severe because of the seasonal high water table.

The seasonal high water table, high potential frost action, and slowly permeable subsoil are severe limitations of this soil for most urban and recreation uses.

This soil is in capability subclass IVw.

Nf—Neversink and Alden soils, very stony. This map unit consists of very deep, poorly drained and very poorly drained soils that formed in glacial till in level or depressional areas of till plains. Some areas are Neversink soils, some are Alden soils, and some consist of both. The total acreage of the map unit is about 45 percent Neversink soils, 40 percent Alden soils, and 15 percent other soils. Slope ranges from 0 to 3 percent. Slopes are commonly slightly hummocky. Stones or boulders 5 to 30 feet apart cover 3 to 15 percent of the surface. Areas of these soils are irregularly oblong or in narrow strips in shape, and are commonly 5 to 15 acres in size but most range from 3 to 30 acres.

Typically, the surface layer of the Neversink soils is dark brown loam about 3 inches thick. The subsurface layer is grayish brown loam about 2 inches thick. The subsoil, to a depth of about 21 inches, is reddish gray gravelly loam and brown gravelly fine sandy loam. The substratum, to a depth of 60 inches or more, is reddish brown gravelly sandy loam.

Typically, the surface layer of the Alden soils is black silt loam about 12 inches thick. The subsoil, to a depth of about 33 inches, is firm, mottled, gray silt loam. The substratum, to a depth of 60 inches or more, is firm brown channery silt loam and reddish gray gravelly silt loam.

Included with this unit in mapping are small areas of very poorly drained organic soils and small areas of somewhat poorly drained Morris and Scriba soils. Also included are areas of soils that do not have stones or boulders. Also included are areas of soils where bedrock is at a depth of 20 to 40 inches. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in Neversink and Alden soils is at or near the surface from late fall to midspring and during other, excessively wet periods. Rooting depth is limited because of very slow internal drainage. The available water capacity is high in the Alden soils and moderate in the Neversink soils. These soils receive runoff from surrounding areas and have excess moisture during most of the year. Runoff is very slow or intermittently ponded.

Most areas of these soils are woodland or idle. Some areas are used for pasture.

These soils are not suitable for cultivation because of large stones on the surface. The seasonal high water table is a serious limitation for farming operations. Unless drainage is installed and surface water is controlled, growing cultivated crops is difficult or impossible. Suitable outlets in some areas, however, are difficult to establish.

These soils can provide limited pasture. The main concerns in pasture management are overgrazing and grazing the pasture when the soil is too wet. Grazing during wet periods compacts the soil surface and causes deterioration of the sod cover. Restricted grazing during wet periods and selecting water-tolerant plant species are suitable management practices. Stones interfere with applying needed lime and fertilizers.

Potential productivity of red maple on these soils is moderate. The equipment limitation, windthrow hazard, and seedling mortality are all severe because of the seasonal high water table.

Slope, permeability, high potential frost action, and the seasonal high water table are severe limitations of these soils for most urban uses. Some areas have potential for use as habitat for wildlife and as sites for ponds.

These soils are in capability subclass VIIs.

OaA—Onteora loam, 0 to 3 percent slopes. This is a very deep, nearly level, somewhat poorly drained soil on till plains in the Catskill Mountains. Slopes are commonly smooth, but some areas have a hummocky

microrelief. Areas of the soil are irregular in shape and range from about 5 to 40 acres in size.

Typically, the surface layer is covered by black organic litter about 3 inches thick. The surface layer is dark brown loam about 4 inches thick. The subsoil in the upper part, to a depth of about 14 inches, is mottled, brown gravelly fine sandy loam and reddish brown gravelly loam. In the lower part it is dense, firm reddish brown gravelly loam to a depth of 60 inches or more.

Included with this soil in mapping, in higher areas, are small areas of moderately well drained Willowemoc soils and well drained Lewbeach soils. Also included, in depressions, are poorly drained or very poorly drained Suny soils and very poorly drained organic soils. Also included are areas of stony or bouldery soils. The included soils range to 2 acres in size and make up about 20 percent of the map unit.

The seasonal high water table in this Onteora soil is perched above the dense, firm part of the subsoil at a depth of 0.5 foot to 1.5 feet from November to April. The available water capacity is low. Surface runoff is slow. Permeability is moderate in the surface layer and in the upper part of the subsoil and slow or very slow in the lower part of the subsoil. Depth to bedrock is more than 60 inches. If the soil has not been limed, it ranges from extremely acid to moderately acid.

Most areas of this soil are forest or idle, and a few areas are used for hay or pasture.

This soil is moderately suited to some cultivated crops. In most years the growing season is several weeks shorter in other parts of the county at lower elevations. The seasonal high water table severely limits many farming operations and restricts the choice of crops that can be grown. Stones also hinder tillage operations. The soil is better suited to forage crops and pasture. If the soil is cultivated, artificial drainage, including subsurface drains, open drains, and diversions, are needed to intercept water from higher areas. In some areas suitable outlets are difficult to establish.

The main concerns in pasture management are overgrazing and grazing when the soil is wet. Reseeding with water-tolerant forage plants is a suitable management practice. Stocking rates within carrying capacity and restricted grazing during wet periods help to maintain higher quality pasture.

Potential productivity of red maple on this soil is moderate. The equipment limitation, seedling mortality, and windthrow hazard are moderate because of the seasonal high water table.

The seasonal high water table, high potential frost action, and slowly permeable or very slowly permeable subsoil are severe limitations of this soil for building site development and as sites for sanitary facilities. In some areas the seasonal high water table is at or near the surface during wet periods.

This soil is in capability subclass IIIw.

OaB—Onteora loam, 3 to 8 percent slopes. This is a very deep, gently sloping, somewhat poorly drained soil on the lower parts of mountainsides in the Catskill Mountains. Slopes are commonly smooth. Areas of the soil are irregular in shape and range from about 5 to 40 acres in size.

Typically, the surface layer is covered by black organic litter about 3 inches thick. The surface layer is dark brown loam about 4 inches thick. The subsoil in the upper part, to a depth of about 14 inches, is mottled, brown gravelly fine sandy loam and reddish brown gravelly loam. In the lower part it is dense, firm reddish brown gravelly loam to a depth of 60 inches or more.

Included with this soil in mapping, in higher areas, are small areas of moderately well drained Willowemoc soils and well drained Lewbeach soils. Also included, in depressions, are poorly drained or very poorly drained Suny soils and very poorly drained organic soils. Also included are areas of stony or bouldery soils. The included soils range to 2 acres in size and make up about 20 percent of the map unit.

The seasonal high water table in this Onteora soil is perched above the dense, firm part of the subsoil at a depth of 0.5 foot to 1.5 feet from November to April. The available water capacity is low. Surface runoff is slow or medium. Permeability is moderate in the surface layer and in the upper part of the subsoil and slow or very slow in the lower part of the subsoil. Depth to bedrock is more than 60 inches. If the soil has not been limed, it ranges from extremely acid to moderately acid.

Most areas of this soil are forest or idle, and a few are used for hay or pasture.

This soil is moderately suited to some cultivated crops. In most years the growing season is several weeks shorter than in parts of the county at lower elevations. The seasonal high water table severely limits many farming operations and restricts the choice of crops that can be grown. Stones also hinder tillage operations. The soil is better suited to forage crops and pasture. If the soil is cultivated, artificial drainage, including subsurface drains, open drains, and diversions, are needed to intercept water from higher areas. In some areas suitable outlets are difficult to establish. Erosion is also a hazard. Cover crops,

conservation tillage, and contour farming help to control erosion.

In pasture, the main management concerns are overgrazing and grazing when the soil is wet. Reseeding with water-tolerant forage plants is a suitable management practice. Stocking rates within carrying capacity and restricted grazing during wet periods will help to maintain higher quality pasture.

Potential productivity of red maple on this soil is moderate. The equipment limitation, seedling mortality, and windthrow hazard all are moderate because of the seasonal high water table.

The seasonal high water table, high potential frost action, and slowly permeable or very slowly permeable subsoil are severe limitations of this soil for building site development and as sites for sanitary facilities. In some areas the seasonal high water table is near the surface during wet periods.

This soil is in capability subclass IIIw.

OaC—Onteora loam, 8 to 15 percent slopes. This is a very deep, strongly sloping, somewhat poorly drained soil on the lower parts of mountainsides in the Catskill Mountains. Slopes are commonly smooth. Areas of the soil are irregular in shape and range from about 5 to 15 acres in size.

Typically, the surface layer is covered by black organic litter about 3 inches thick. The surface layer is dark brown loam about 4 inches thick. The subsoil in the upper part, to a depth of about 14 inches, is mottled, brown gravelly fine sandy loam and reddish brown gravelly loam. In the lower part it is dense, firm reddish brown gravelly loam to a depth of 60 inches or more.

Included with this soil in mapping, in higher areas, are small areas of moderately well drained Willowemoc soils and well drained Lewbeach soils. Also included are areas of stony or bouldery soils. The included soils range to 2 acres in size and make up about 20 percent of the map unit.

The seasonal high water table in this Onteora soil is perched above the dense, firm, part of the subsoil at a depth of 0.5 foot to 1.5 feet from November to April. The available water capacity is low. Surface runoff is medium. Permeability is moderate in the surface layer and in the upper part of the subsoil and slow or very slow in the lower part of the subsoil. Depth to bedrock is more than 60 inches. If the soil has not been limed, it ranges from extremely acid to moderately acid.

Most areas of this soil are forest or idle, and a few areas are used for hay and pasture.

This soil is moderately suited to some cultivated crops. In most years the growing season is several weeks shorter than in parts of the county at lower elevations. The seasonal high water table severely limits many farming operations and restricts the choice of crops that can be grown. Stones and slope also hinder tillage operations. The soil is better suited to forage crops or pasture. If the soil is cultivated, artificial drainage, including subsurface drains, open drains, and diversions, are needed to intercept water from higher areas. Erosion is a hazard. Conservation tillage and cover crops help to maintain the productivity of this soil and to control erosion.

In pasture, the main management concerns are overgrazing and grazing when the soil is wet. Reseeding with water-tolerant forage plants is a suitable management practice. Stocking rates within carrying capacity and restricted grazing during wet periods will help to maintain higher quality pasture.

Potential productivity of red maple on this soil is moderate. The equipment limitation, seedling mortality, and windthrow hazard all are moderate because of the seasonal high water table.

The seasonal high water table, high potential frost action, and slowly permeable or very slowly permeable subsoil are severe limitations of this soil for building site development and as sites for sanitary facilities. Slope and the erosion hazard are also limitations to development. The seasonal high water table is near the surface during wet periods.

This soil is in capability subclass IIIe.

ObB—Onteora loam, 2 to 8 percent slopes, very stony. This is a very deep, gently sloping, somewhat poorly drained soil on the lower parts of mountainsides in the Catskill Mountains and, in some areas, along small drainageways. Slopes are commonly smooth and range from about 2 to 8 percent. Stones and boulders more than 10 inches in diameter and about 5 to 30 feet apart cover 3 to 15 percent of the surface. Areas of the soil are irregular in shape and range from about 5 to 25 acres in size.

Typically, the surface layer of the Onteora soil is loam about 4 inches thick. The subsoil in the upper part, to a depth of 14 inches, is mottled, brown gravelly fine sandy loam and mottled, reddish brown gravelly loam. In the lower part, to a depth of 60 inches or more, it is dense, firm, reddish brown gravelly loam.

Included with this soil in mapping, in higher areas, are small areas of moderately well drained Willowemoc soils and well drained Lewbeach soils. Poorly drained or very poorly drained Suny soils and very poorly drained organic soils are in depressions. Also included

are small areas of soils that do not have stones or boulders. The included soils range to 5 acres in size and make up about 20 percent of the map unit.

The seasonal high water table in this Onteora soil is perched above the dense, firm part of the subsoil at a depth of 0.5 foot to 1.5 feet from November to April. The available water capacity is low. Surface runoff is slow or medium. Permeability is moderate in the surface layer and in the upper part of the subsoil and slow or very slow in the lower part of the subsoil. Depth to bedrock is more than 60 inches. If the soil has not been limed, it ranges from extremely acid to moderately acid.

Most areas of this soil are forest or idle, and a few areas are used for pasture.

This soil is not suited to cultivated crops unless it is cleared of stones. The growing season is commonly several weeks shorter than in parts of the county at lower elevations. If the stones are removed, artificial drainage, including subsurface drains, open drains, and diversions are needed to intercept water from higher areas.

This soil is fairly suited to pasture. The main concern in pasture management is grazing when the soil is wet. Reseeding with water-tolerant forage plants is a suitable management practice. Stocking rates within carrying capacity and restricted grazing during wet periods will help to maintain higher quality pasture. Stones interfere with pasture improvement practices.

Potential productivity of red maple on this soil is moderate. The equipment limitation, seedling mortality, and windthrow hazard are moderate because of the seasonal high water table.

The seasonal high water table, high potential frost action, and slowly permeable or very slowly permeable subsoil are severe limitations of this soil for building site development and as sites for sanitary facilities. In some areas the seasonal high water table is near the surface during wet periods. Stones also interfere with urban development.

This soil is in capability subclass VIIs.

OeB—Oquaga very channery silt loam, 3 to 8 percent slopes. This is a moderately deep, gently sloping, well drained to excessively well drained soil on hilltops on bedrock-controlled uplands. Slopes are smooth and slightly convex. Areas of the soil are oblong or irregular in shape and range from about 3 to 25 acres in size.

Typically, the surface layer of the Oquaga soil is covered with a layer of organic litter about 2 inches thick. The surface layer is dark reddish brown very channery silt loam about 4 inches thick. The subsoil is red, dark red, reddish brown, and dark reddish brown very channery loam to a depth of 34 inches. Weak red shale bedrock is at a depth of 34 inches.

Included with this soil in mapping are small areas of shallow Arnot soils and very deep Lackawanna, Wellsboro, and Cheshire soils. Also included are small areas of shallower and wetter Tuller soils and moderately well drained, moderately deep soils. A few small areas of stony or bouldery soils are indicated on the soil map by special symbols. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Oquaga soil is commonly not above the bedrock. Permeability, or rate of water movement through the soil, is moderate. Surface runoff is medium. The available water capacity is low or moderate. Bedrock, commonly red shale, is at a depth of 20 to 40 inches. If the soil has not been limed, the surface layer and the subsoil are extremely acid to moderately acid.

Many areas of this soil are used for farming. Other areas are forest or idle.

This soil is well suited to cultivated crops, hay, and pasture. The very channery surface layer, droughtiness in summer, and the slight erosion hazard are limitations to intensive cropping. Cover crops, conservation tillage, and crop residue returned to the soil help to control erosion and to maintain soil productivity. Restricted grazing during dry periods helps to maintain a permanent sod cover.

Potential productivity of sugar maple on this soil is moderate. There are no limitations to woodland use and management.

Bedrock at a depth of 20 to 40 inches is the main limitation to use of this soil for building sites and as sites for sanitary facilities. This is a severe limitation for sites for dwellings with basements and for septic tank absorption fields. This is a moderate limitation for sites for dwellings without basements and for local streets and roads.

This soil is in capability subclass IIe.

OgC—Oquaga-Arnot complex, 8 to 15 percent slopes. This map unit consists of strongly sloping soils on hillsides on bedrock-controlled uplands. It is about 50 percent Oquaga soil, 35 percent Arnot soil, and 15 percent other soils. The Oquaga soil is moderately deep and well drained to excessively drained. The Arnot soil is shallow and somewhat excessively drained to moderately well drained. The Oquaga and Arnot soils are in such an intricate pattern that they could not be mapped separately at the scale selected for mapping.

Areas of these soils are oval, or irregular and elongated in shape. They range from about 3 to 35 acres in size but are commonly 5 to 20 acres.

Typically, the surface layer of the Oquaga soil is covered with a thin layer of organic litter. The surface layer is dark reddish brown very channery silt loam about 4 inches thick. The subsoil, to a depth of about 34 inches, is red, dark red, and reddish brown very channery loam Weak red shale bedrock is below a depth of 34 inches.

Typically, the surface layer of the Arnot soil is covered with a thin layer of dark, decomposed leaves and twigs. The surface layer is dark grayish brown channery loam about 2 inches thick. The subsoil, to a depth of about 16 inches, is brownish yellow and yellowish brown very channery loam. Hard, light gray sandstone bedrock is at a depth of 16 inches.

Included with this unit in mapping are small areas of deep Lackawanna, Wellsboro, and Cheshire soils. Also included are areas of stony or bouldery soils and scattered areas of rock outcrops. The included soils and areas of rock outcrops range from about 0.1 to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in the Oquaga soil is usually not perched above bedrock. Permeability, or rate of water movement through the soil, is moderate. Surface runoff is rapid. The available water capacity is low or moderate. Bedrock, commonly red shale, is at a depth of 20 to 40 inches. If the soil has not been limed, the surface layer and the subsoil are extremely acid to moderately acid.

The seasonal high water table in the Arnot soil is perched above bedrock for brief periods in spring, but is normally not above bedrock. Permeability is moderate. Surface runoff is rapid. The available water capacity is low or very low. Bedrock is at a depth of 10 to 20 inches. If the soil has not been limed, the surface layer ranges from extremely acid to moderately acid.

Many areas of the soils in this map unit are used for farming. Other areas are forest or idle.

These soils are moderately suited to cultivated crops, hay, and pasture. The very channery surface layer, droughtiness in summer, the moderate erosion hazard, and small areas of shallow soils are limitations to intensive cropping. Cover crops, conservation tillage, stripcropping, or other practices help to control erosion and to maintain soil productivity. Restricted grazing during dry periods in summer help to maintain a permanent sod cover.

Potential productivity of northern red oak on these soils is moderate. On the Arnot soil, rooting depth is restricted and windthrow is a moderate hazard.

Moderate depth to bedrock in the Oquaga soil and shallow depth to bedrock in the Arnot soil are severe limitations on sites for sanitary facilities. The limitations of these soils are severe for building site development. On the Oquaga soil, the limitation is moderate for local roads and streets and for dwellings without basements.

These soils are in capability subclass IIIe.

OgD—Oquaga-Arnot complex, 15 to 25 percent slopes. This map unit consists of moderately steep soils on hillsides on bedrock-controlled uplands. It is about 50 percent Oquaga soil, 35 percent Arnot soil, and 15 percent other soils. These soils are in such an intricate pattern that they could not be mapped separately at the scale selected for mapping. The Oquaga soil is moderately deep and well drained to excessively drained. The Arnot soil is shallow and somewhat excessively drained to moderately well drained. Slopes are mostly smooth and convex. Areas of these soils are elongated and irregular in shape and range from about 3 to 40 acres in size but are commonly 5 to 20 acres.

Typically, the surface layer of the Oquaga soil is covered with a thin layer of organic litter. The surface layer is dark reddish brown very channery silt loam about 4 inches thick. The subsoil, to a depth of about 34 inches, is a red, dark red, and reddish brown very channery loam. Weak red shale bedrock is below a depth of 34 inches.

Typically, the surface layer of the Arnot soil is covered with a thin layer of dark, decomposed leaves and twigs. The surface layer is dark grayish brown channery loam about 2 inches thick. The subsoil, to a depth of about 16 inches, is brownish yellow and yellowish brown very channery loam. Hard, light gray sandstone bedrock is at a depth of 16 inches.

Included with this unit in mapping are small areas of deep Lackawanna, Wellsboro, and Cheshire soils. Also included are small areas of stony or bouldery soils and scattered areas of rock outcrops. The included soils and areas of rock outcrops range from about 0.1 to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in the Oquaga soil is usually not perched above bedrock. Permeability, or rate of water movement through the soil, is moderate. Surface runoff is rapid. The available water capacity is low or moderate. Bedrock, commonly red shale, is at a depth of 20 to 40 inches. If the soil has not been limed, the surface layer and the subsoil are extremely acid to moderately acid.

The seasonal high water table in the Arnot soil is perched above bedrock for brief periods in spring, but is

usually not above bedrock. Permeability is moderate. Surface runoff is rapid or very rapid. The available water capacity is low or very low. Bedrock is at a depth of 10 to 20 inches. If the soil has not been limed, the surface layer is extremely acid to moderately acid.

Many areas of these soils are idle or forest, and some areas are used for farming.

These soils are poorly suited to cultivated crops. The main limitations are slope, the erosion hazard, and in some areas, shallow soils. The soils are suited to hay and pasture, but slope limits the use of farm machinery. Summer dry periods will severely limit growth of forage crops. Restricted grazing during summer dry periods will help to maintain a permanent sod cover and to control erosion.

Potential productivity of northern red oak on these soils is moderate. The equipment limitation is moderate because of slope. On the Arnot soil, seedling mortality is high because rooting depth is limited.

Slope, moderate depth to bedrock on the Oquaga soil, and shallow depth to bedrock on the Arnot soil are severe limitations on building sites and on sites for sanitary facilities.

These soils are in capability subclass IVe.

Os—Ossipee muck. This is a very deep, nearly level, very poorly drained soil in depressions in the Catskill Mountains. It is subject to ponding throughout much of the year. Areas of the soil are smooth or slightly hummocky. They are rounded or irregular in shape and about 5 to 20 acres in size. Slope range is 0 to 2 percent.

Typically, the surface layer is covered with a mat of moss and roots about 2 inches thick. The surface layer is about 40 inches thick. In the uppermost 11 inches it is black muck. Below that, it is dark reddish brown and dark brown mucky peat. The substratum is gray silt loam to a depth of 60 inches or more.

Included with this Ossipee soil in mapping are small areas of Greenwood soils that have a thicker layer of organic material. Also included, at the edge of depressions, are areas of Suny and Onteora soils. The included soils range to about 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Ossipee soil is at or near the surface for most of the year. The available water capacity is high. Surface runoff is ponded or very slow. Permeability is moderately rapid or moderate in the organic part and moderately slow or moderate in the mineral substratum. Depth to bedrock is more than 60 inches. The organic layers are extremely acid or very strongly acid.

Areas of this soil are covered with low-growing or brushy, wetland vegetation or water-tolerant trees.

This soil is not suited to farming or crops normally grown in the area because of the seasonal high water table and acid soil conditions. The growing season is several weeks shorter than in other parts of the county at lower elevations. Extensive drainage is required to work this soil but suitable outlets are commonly difficult to establish.

Potential productivity of black spruce on this soil is low. The equipment limitation is severe because of the seasonal high water table and low soil strength. Seedling mortality, windthrow hazard, and plant competition are also severe because of the seasonal high water table.

Excess humus, the seasonal high water table, ponding, slow permeability, and low soil strength are severe limitations of this soil for building site development and as sites for sanitary facilities.

This soil is in capability subclass Vw.

OtA—Otisville gravelly loamy coarse sand, 0 to 3 percent slopes. This is a nearly level, very deep, excessively drained soil that formed in glacial outwash. It is on smooth, convex landforms on outwash terraces, small knolls, and small winding ridges. Areas of the soil are irregular in shape, are narrow to broad along valleys, and range from 3 to 20 acres in size.

Typically, the surface layer is dark brown gravelly loamy coarse sand about 9 inches thick. The subsoil is about 24 inches thick. It is loose, yellowish brown very gravelly and extremely gravelly loamy coarse sand. The substratum is brown sand and gravel to a depth of 60 inches or more.

Included with this soil in mapping are small areas of moderately well drained or somewhat poorly drained Pompton soils, somewhat poorly drained Red Hook soils, and Fluvaquents and Udifluvents that are subject to frequent flooding and are adjacent to streams. Included sand and gravel pits are indicated on the soil map by special symbols. The included areas range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Otisville soil is at a depth of more than 6 feet. Permeability is rapid or very rapid. The available water capacity is very low. Surface runoff is slow. Depth to bedrock is more than 60 inches. In areas adjacent to streams, these soils are subject to brief flooding during periods of very high water. Gravel or cobbles are common in the surface layer and increase in abundance in the subsoil. If the soil has not been limed, the surface layer and the

subsoil are extremely acid to strongly acid.

Some areas of this soil are used, to a limited extent, for farming. Other areas are used as homesites or are in recreation use. Many areas have reverted to brush and forest.

This soil is suited to some forage crops and other deep-rooted crops grown in the region. It is poorly suited to cultivated crops. Droughtiness is a problem if extended dry periods occur. A gravelly surface layer will hinder some tillage operations and cause excessive wear of equipment. Fertility level of this soil is very low. Cover crops and crop residue returned to the soil increase organic matter content and help to maintain good soil tilth and to increase the available water capacity.

Potential productivity of eastern white pine on this soil is high. Seedling mortality is severe because of droughtiness. Planting when the soil is moist, cutting brush and weeds before planting, and selecting adaptable varieties help to increase seedling survival.

The limitations of this soil are slight for dwellings, small commercial buildings, and local streets and roads. The limitations are severe for shallow excavations because of cave-ins and small stones. Droughtiness and surface gravel are limitations in establishing lawns or laying a sod cover. The limitations are severe for sanitary facilities because of poor filtering of the effluent and seepage. If the soil is used for waste disposal systems, ground water contamination is a hazard because of rapid or very rapid permeability.

This soil is in capability subclass IVs.

OtB—Otisville gravelly loamy coarse sand, 3 to 8 percent slopes. This is a gently sloping, very deep, excessively drained soil that formed in glacial outwash. It is on slightly convex landforms on outwash terraces, small knolls, and small winding ridges. Areas of the soil are irregular in shape, are narrow to broad along valleys, and range from 3 to 15 acres in size.

Typically, the surface layer is dark brown gravelly loamy coarse sand about 9 inches thick. The subsoil is about 24 inches thick. It is loose, yellowish brown very gravelly and extremely gravelly loamy coarse sand. The substratum is brown sand and gravel to a depth of 60 inches or more.

Included with this soil in mapping are small areas of moderately well drained or somewhat poorly drained Pompton soils, somewhat poorly drained Red Hook soils, and Fluvaquents and Udifluvents that are subject to frequent flooding and are adjacent to streams. Included sand and gravel pits are indicated on the soil map by special symbols. The included areas range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Otisville soil is at a depth of more than 6 feet. Permeability is rapid or very rapid. The available water capacity is very low. Surface runoff is slow or medium. Gravel or cobbles are common in the surface layer and increase in abundance in the subsoil. Depth to bedrock is more than 60 inches. If the soil has not been limed, the surface layer and the subsoil are extremely acid to strongly acid.

Some areas of this soil are used, to a limited extent, for farming. Other areas are used as homesites or are in recreation use. Many areas have reverted to brush and forest.

This soil is suited to some forage crops and other deep-rooted crops grown in the region. It is poorly suited to cultivated crops. Droughtiness is a problem if extended dry periods occur. A gravelly surface layer will hinder some tillage operations and cause excessive wear of equipment. The fertility level of this soil is very low. Cover crops and crop residue returned to the soil increase organic matter content and help to maintain good soil tilth and to increase the available water capacity.

Potential productivity of eastern white pine on this soil is high. Seedling mortality is severe because of droughtiness. Planting when the soil is moist, cutting brush and weeds before planting, and selecting adaptable varieties help to increase seedling survival.

The limitations to use of this soil are slight for dwellings and local roads and streets. Slope is a moderate limitation for small commercial buildings. Grading is needed during construction of parking lots or industrial sites. Cave-ins and small stones are severe limitations for shallow excavations. Droughtiness and surface gravel are limitations in establishing lawns and laying a sod cover. Poor filtering and seepage are severe limitations on sites for sanitary facilities. If the soil is used for waste disposal systems, ground water contamination is a hazard because of rapid or very rapid permeability.

This soil is in capability subclass IVs.

OtC—Otisville gravelly loamy coarse sand, 8 to 15 percent slopes. This is a very strongly sloping, very deep, excessively drained soil that formed in glacial outwash. It is on the sides of convex landforms on outwash terraces, small knolls, and small winding ridges. Areas of the soil are irregular in shape, are narrow to broad along valleys, and range from 3 to 15 acres.

Typically, the surface layer is dark brown gravelly

loamy coarse sand about 9 inches thick. The subsoil is about 24 inches thick. It is loose, yellowish brown very gravelly and extremely gravelly loamy coarse sand. The substratum is brown sand and gravel to a depth of 60 inches or more.

Included with this soil in mapping are small areas of moderately well drained to somewhat poorly drained Pompton soils and somewhat poorly drained Red Hook soils. The included sand and gravel pits are indicated on the soil map by special symbols. The included areas range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Otisville soil is at a depth of more than 6 feet. Permeability is rapid or very rapid. The available water capacity is very low. Surface runoff is medium. Gravel or cobbles are common in the surface layer and increase in abundance in the subsoil. Depth to bedrock is more than 60 inches. If the soil has not been limed, the surface layer and the subsoil are extremely acid to strongly acid.

Some areas of this soil are used, to a limited extent, for farming. Other areas are used as homesites or are in recreation use. Many areas have reverted to brush and forest.

This soil is suited to some forage crops and other deep-rooted crops grown in the region. It is poorly suited to cultivated crops. Droughtiness is a problem if extended dry periods occur. Slope limits the use of some farm machinery. A gravelly surface layer will hinder tillage operations and cause excessive wear of equipment. Soil fertility is low. Cover crops and crop residue returned to the soil increase organic matter content and help to maintain good soil tilth and to increase the available water capacity.

Potential productivity of eastern white pine on this soil is high. Seedling mortality is severe because of droughtiness. Planting when the soil is moist, cutting brush and weeds before planting, and selecting adaptable varieties help to increase seedling survival.

Slope is a moderate limitation to use of this soil as sites for dwellings and local roads and streets. Slope is a severe limitation on sites for small commercial buildings. Grading during construction will help to overcome this limitation. Cave-ins and small stones are severe limitations for shallow excavations. Droughtiness and surface gravel are limitations in establishing lawns and laying a sod cover. Poor filtering of the effluent, rapid seepage, and slope are severe limitations for sanitary facilities. If the soil is used for waste disposal systems, ground water contamination is a hazard because of rapid or very rapid permeability.

This soil is in capability subclass IVs.

OtD—Otisville gravelly loamy coarse sand, 15 to 25 percent slopes. This is a moderately steep, very deep, excessively drained soil that formed in glacial outwash. It is on the sides of outwash terraces, small knolls, and small winding ridges. Areas of the soil are irregular in shape or round and range from 3 to 15 acres.

Typically, the surface layer is dark brown gravelly loamy coarse sand about 9 inches thick. The subsoil is loose, yellowish brown very gravelly and extremely gravelly loamy coarse sand about 24 inches thick. The substratum is loose, brown sand and gravel that extends to a depth of 60 inches or more.

Included with this soil in mapping are small areas of less gravelly Riverhead and Valois soils. Included sand and gravel pits are indicated on the soil map by special symbols. The included soils range to 2 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Otisville soil is at a depth of more than 6 feet. Permeability is rapid or very rapid. The available water capacity is very low. Surface runoff is medium. Gravel or cobbles are common in the surface layer and increase in abundance in the subsoil. Depth to bedrock is more than 60 inches. If the soil has not been limed, the surface layer and the subsoil are extremely acid to strongly acid.

Most areas of this soil are covered with brush, trees, or nonwoody plants. A few small areas are used for forage crops.

This soil is poorly suited to most crops grown in the region. Droughtiness is a problem if even short dry periods occur. Slope and the gravelly surface layer will hinder tillage operations and cause excessive wear of equipment. Soil fertility is low. Erosion is a serious hazard if the vegetative cover is disturbed. Deep-rooted forage crops can provide some hay and pasture, but sod is difficult to establish.

Potential productivity of eastern white pine on this soil is high. Seedling mortality is severe because of droughtiness. The equipment limitation is moderate. Planting when the soil is moist, cutting brush and weeds before planting, and selecting adaptable varieties help to increase seedling survival.

Slope and the erosion hazard are severe limitations to use of this soil for building site development. Cave-ins and small stones are severe limitations on sites for shallow excavations. Droughtiness and surface gravel are limitations in establishing lawns and laying a sod cover. Poor filtering of the effluent, rapid seepage, and slope are severe limitations on sites for sanitary facilities. If the soil is used for waste disposal systems, ground water contamination is a hazard because of

rapid or very rapid permeability.

This soil is in capability subclass VIs.

Pa—Palms muck. This is a very deep, level, very poorly drained soil in small depressions or bogs on till or outwash plains. In most years, it is subject to ponding from November through May. Some areas are smooth, and others are slightly hummocky. Areas of the soil are small and round or are larger and irregular in shape. They range from 3 to 40 acres in size. Slope ranges from 0 to 2 percent.

Typically, the surface layer is black muck about 22 inches thick. The substratum extends to a depth of 60 inches or more. It is grayish brown fine sandy loam in the upper part, gray silt loam in the middle part, and mottled gray and red loam in the lower part.

Included with this soil in mapping are small areas of Carlisle, Alden, Wayland, and Neversink soils. The organic layers in Palms soils are not as thick as those in Carlisle soils but are much thicker than those in Alden and Wayland soils. Neversink soils do not have a thick, black organic surface layer. The included soils range to about 3 acres in size and make up about 15 percent of the map unit.

The water table in this Palms soil is at or near the surface for much of the period from late fall through spring. The available water capacity is high. Surface runoff is ponded or very slow. Permeability is moderately rapid to moderately slow in the organic layer and moderate or moderately slow in the mineral layers. Depth to bedrock is more than 60 inches. The organic layer is compressible and unstable. The surface layer is strongly acid to slightly acid.

Most areas of this soil are covered by wetland or marshy vegetation or water-tolerant trees.

This soil is not suited to cultivated crops normally grown in the area because it is ponded much of the year. It is on the lower part of the landscape where drainage outlets are commonly not available.

Potential productivity of red maple on this soil is moderate. The equipment limitation, windthrow hazard, and seedling mortality are severe because of the water table and low soil strength. The soil can be developed as habitat for wetland wildlife.

Excess humus, the seasonal high water table, subsidence, ponding, and low soil strength are severe limitations of this soil.

This soil is in capability subclass Vw.

Pe—Philo silt loam. This is a very deep, nearly level, moderately well drained soil on flood plains along streams. It is subject to occasional flooding, and some areas have been cut by old stream channels. Areas of the soil are long and narrow and range from about 3 to 15 acres in size. Slope ranges from 0 to 3 percent.

Typically, the surface layer is dark brown silt loam about 10 inches thick. The subsoil is about 28 inches thick. It is dark brown silt loam in the upper part, yellowish brown silt loam in the middle part, and light brownish gray, mottled silt loam in the lower part. The substratum extends to a depth of 60 inches or more. It is mottled, light brownish gray fine sandy loam in the upper part and multicolored, gray and pale brown loamy fine sand in the lower part.

Included with this soil in mapping are small areas of excessively drained, sandy Suncook soils and well drained Pope soils. Also included, in low-lying areas and old stream channels, are poorly drained and very poorly drained Wayland soils. Also included are areas of soils that have a very gravelly surface layer and subsurface layer. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Philo soil is at a depth of 1.5 to 3 feet during winter and early spring. The available water capacity is moderate or high. Surface runoff is slow. Permeability is moderate above the sandy layer and moderately rapid in the sandy layer. Depth to bedrock is more than 60 inches. The soil is subject to occasional flooding, usually during late winter or early spring. If the soil has not been limed, the surface layer and the subsoil are very strongly acid to moderately acid.

Most areas of this soil are forest or idle. A few small fields have been cleared and are used for pasture.

This soil is well suited to cultivated crops and forage crops. It is among the soils in the county that are best suited to food and fiber production. The seasonal high water table and flooding hinder farming operations. Although flooding does not normally occur during the growing season, in some areas it deposits sediment and debris. Drainage can be improved by installing subsurface drains and field ditches. In places periodic removal of sediment and debris is needed.

This soil is suited to hay or pasture, although in some areas old stream channels interfere with harvesting equipment. Restricted grazing during wet periods will help maintain the sod cover and quality of pasture.

Potential of northern red oak on this soil is moderately high. The equipment limitation is moderate because of the seasonal high water table.

Flooding and the seasonal high water table are severe limitations to use of this soil for building site development and as sites for sanitary facilities. Poor

filtering and seepage are also limitations on sites for sanitary facilities. The soil can provide good habitat for wildlife and is suited to certain recreation uses.

This soil is in capability subclass IIw.

Pg—Pits, gravel. This map unit consists of excavations mainly in areas of gravelly and sandy glacial outwash. The pits result from the removal of gravel or sand for use in construction. They are 3 to 50 feet deep. Their sides are commonly nearly vertical, and their floors are irregular. Piles of stones and boulders are commonly scattered on the pit floor. Small ponds or shallow pools of water are commonly in the larger pits. The pits are commonly irregular in shape, and range from 3 to more than 80 acres in size.

Pits, gravel, are generally devoid of vegetation, but some older ones have scattered bushes, grasses, or annuals. The available water capacity is very low. Permeability differs from place to place but generally is moderately rapid to very rapid.

Pits, gravel, are poorly suited to use for agriculture, as woodland, and as wildlife habitat. They are well suited to poorly suited to urban or recreation use. Onsite investigations are needed to determine suitability of a certain site for a specific purpose.

Pits, gravel, are poorly suited to farming and woodland use because of the very low available water capacity.

If Pits, gravel, are used for sanitary waste disposal, ground water pollution is a hazard.

This map unit has not been assigned to a capability subclass.

Ph—Pits, quarry. This map unit consists of open excavations commonly made to obtain stone for construction projects. Sandstone or shale is cut into blocks for building or is blasted and then removed as crushed stone for use on roads and driveways. Quarries generally have one or two nearly vertical sides and a nearly level or gently sloping floor. Piles of stone rubble, loose stones, flags, or soil material are commonly in the bottom of the quarries or in nearby areas. The excavations are irregular in shape and range from 2 to more than 50 acres in size. Shallow or moderately deep Arnot, Oquaga, and Lordstown soils are in areas around quarries.

Pits, quarry, generally do not have vegetation, but some support scattered bushes, grasses, or annuals. They are poorly suited to use for recreation or as habitat for wildlife. Only after a major reclamation is a quarry site suited to agricultural or urban use.

This map unit has not been assigned to a capability subclass.

PmA—Pompton gravelly fine sandy loam, 0 to 3 percent slopes. This is a nearly level, very deep, moderately well drained or somewhat poorly drained soil on outwash plains and terraces. It is subject to rare flooding. Areas of the soil are irregular in shape or roughly oval and range from about 3 to 15 acres in size.

Typically, the surface layer is brown gravelly fine sandy loam about 10 inches thick. The subsoil is about 20 inches thick. It is yellowish brown gravelly sandy loam in the upper part and strong brown sandy loam in the lower part. The substratum is yellowish brown gravelly sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of slightly wetter Red Hook and Raynham soils in depressions. Also included, along streams, are small areas of Philo and Bash soils, which are subject to flooding. Also included, in slightly higher areas, are better drained, more gravelly Chenango and Tunkhannock soils or better drained Riverhead soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

Permeability in this Pompton soil is moderately rapid or moderate in the surface layer and the subsoil. Surface runoff is slow. The available water capacity is moderate. If the soil has not been limed, the surface layer and the subsoil are strongly acid or very strongly acid. The seasonal high water table is at a depth of 1 to 2 feet from midfall through spring. Depth to bedrock is more than 60 inches. The soil is subject to rare flooding.

Most areas of this soil are forest or idle. A few small fields are used for pasture or hay.

This soil is well suited to cultivated crops, but the seasonal high water table restricts rooting depth and limits choice of crops. Where drained, it is among the soils in the county that are best suited to food and fiber production. In some years, farming operations are restricted during wet periods. Subsurface drainage systems will help to lower the water table. Crop residue use and regular additions of organic material will help to maintain soil tilth and to increase infiltration.

This soil is well suited to pasture and hay. The main limitation is the seasonal high water table. Planting water-tolerant species is a suitable management practice. Preventing overgrazing and restricting grazing during wet periods will help to maintain higher quality pasture.

Potential productivity of red maple on this soil is

moderately high. The equipment limitation, windthrow hazard, and seedling mortality rate are moderate because of the seasonal high water table.

The seasonal high water table is a severe limitation to use of this soil for most urban uses. Potential frost action and rare flooding are also limitations. The seasonal high water table is a moderate limitation for most recreation uses.

This soil is in capability subclass IIw.

PmB—Pompton gravelly fine sandy loam, 3 to 8 percent slopes. This is a nearly level, very deep, moderately well drained or somewhat poorly drained soil on outwash plains and terraces. It is subject to rare flooding. Areas of the soil are irregular in shape or roughly oval and range from about 3 to 15 acres in size.

Typically, the surface layer is brown gravelly fine sandy loam about 10 inches thick. The subsoil is about 20 inches thick. It is yellowish brown gravelly sandy loam in the upper part and strong brown sandy loam in the lower part. The substratum is yellowish brown gravelly sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of slightly wetter Red Hook and Raynham soils in depressions. Also included, along streams, are small areas of Philo and Bash soils, which are subject to flooding. Also included, in slightly higher areas, are better drained, more gravelly Chenango and Tunkhannock soils or better drained Riverhead soils. The included soils range to 3 acres in size, and make up about 15 percent of the map unit.

Permeability in this Pompton soil is moderate or moderately rapid in the surface layer and the subsoil. Surface runoff is medium. The available water capacity is moderate. If the soil has not been limed, the surface layer and the subsoil are strongly acid or very strongly acid. The seasonal high water table is at a depth of 1 to 2 feet from midfall through spring. Depth to bedrock is more than 60 inches.

Most areas of this soil are forest or idle. A few small fields are used for pasture or hay.

This soil is well suited to cultivated crops, but the seasonal high water table restricts rooting depth and limits choice of crops. Where drained, it is among the soils in the county that are best suited to food and fiber production. In some years, farming operations are restricted during wet periods. Subsurface drainage systems will help to lower the water table. In erodible areas, conservation tillage and contour farming help to control erosion. Crop residue use and regular additions of organic material will help to maintain soil tilth and to increase infiltration.

This soil is well suited to pasture and hay. The main limitation is the seasonal high water table. Planting water-tolerant species is a suitable management practice. Preventing overgrazing and restricting grazing during wet periods will help to maintain higher quality pasture.

Potential productivity of red maple on this soil is moderately high. The equipment limitation, windthrow hazard, and seedling mortality rate are moderate because of the seasonal high water table.

The seasonal high water table is a severe limitation to use of this soil for most urban uses. Potential frost action and rare flooding are also limitations. The seasonal high water table is a moderate limitation for most recreation uses.

This soil is in capability subclass IIw.

Po—Pope silt loam, occasionally flooded. This is a very deep, nearly level, well drained soil on flood plains along streams. It is subject to occasional flooding for brief periods from November through April. Areas of the soil are relatively long and narrow and range from 5 to 25 acres in size. Slope ranges from 0 to 3 percent.

Typically, the surface layer is very dark grayish brown silt loam about 3 inches thick. The subsoil is about 29 inches thick. It is dark brown loam in the upper part and yellowish brown and dark brown silt loam in the lower part. The substratum is brown fine sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Suncook, Philo, and Wayland soils. The Pope soil is not as sandy as Suncook soils. The Pope soil is better drained than Philo and Wayland soils. Also included, in some parts of the county, are redder, well drained Barbour soils that have a very gravelly substratum. Also included are some small areas of very gravelly or cobbly soils. The included soils range to 3 acres in size, and make up about 15 percent of the map unit.

Permeability of this Pope soil is moderate in the upper part and moderate or moderately rapid in the lower part. Surface runoff is slow. The water table is below a depth of 6 feet. The available water capacity is moderate or high. The soil is subject to flooding, generally in late winter or early spring. If the soil has not been limed, the surface layer and the subsoil are extremely acid to strongly acid. Depth to bedrock is generally more than 60 inches.

Most areas of this soil are forest or idle. A few areas are used for cultivated crops or hay.

This soil is well suited to intensive cropping. It is among the soils in the county that are best suited to food and fiber production. In some years brief flooding

in the early spring delays some farming operations, but flooding does not usually occur during the growing season. Cover crops, crop residue use, and tillage at proper moisture levels help to maintain good soil tilth and good productivity.

This soil is well suited to pasture and hay.

Potential productivity of yellow poplar on this soil is high. There are few or no limitations to woodland use and management.

Flooding is a severe limitation of this soil for most urban uses. Flooding is a moderate limitation for picnic areas and playgrounds.

This soil is in capability subclass IIw.

Pp—Pope very fine sandy loam, rarely flooded. This is a nearly level, very deep, well drained soil on terraces along the Delaware River. Areas of the soil are broad and elongated, and range from about 20 to 50 acres or more. Slope ranges from 0 to 3 percent.

Typically, the soil surface layer is very dark grayish brown very fine sandy loam about 6 inches thick. The subsoil is brown and yellowish brown loam and silt loam about 25 inches thick. The substratum extends to a depth of 60 inches or more. It is brown fine sandy loam that has some pockets of sandier material.

Included with this soil in mapping are small areas of well drained or somewhat excessively drained, gravelly Tunkhannock soils and well drained, sandy Riverhead soils. Also included are areas of moderately well drained Scio soils and somewhat poorly drained Raynham soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

Depth to the seasonal high water table in this Pope soil is more than 6 feet. The available water capacity is moderate or high. Surface runoff is slow. Permeability is moderate in the upper part and moderate or moderately rapid in the lower part. The soil ranges from extremely acid to strongly acid. Depth to bedrock is more than 60 inches.

Some areas of this soil are used for farming. Other areas are in recreation use or are idle.

This soil is well suited to intensive cropping. It ranks among the soils in the county that are best suited to food and fiber production. Cover crops, crop residue incorporated into the soil, and tillage at proper moisture levels will help to maintain good productivity and good soil tilth. The soil is also well suited to certain special crops and nurseries as well as pasture and hay.

Potential productivity of yellow poplar on this soil is high. There are few or no limitations to woodland use and management.

Flooding is a severe limitation of this soil for building site development. Seepage in the substratum and flooding are moderate limitations on sites for septic tank absorption fields. The soil is subject to caving during excavating operations. It is well suited to most types of recreation development.

This soil is in capability class I.

Ra—Raynham silt loam. This is a very deep, nearly level, somewhat poorly drained or poorly drained soil that formed in water-laid deposits of coarse silts and sands. It is on smooth, old, glacial stream terraces and in upland basins that were formerly occupied by glacial lakes. Areas of the soil are long, narrow, and irregular in shape or oval, and range from 3 to 50 acres in size. Slope ranges from 0 to 3 percent.

Typically, the surface layer is dark grayish brown silt loam about 8 inches thick. The subsurface layer is mottled, pale brown silt loam to a depth of about 12 inches. The subsoil in the upper part, to a depth of 16 inches, is mottled, brown and pale brown silt loam. In the lower part, to a depth of 30 inches, it is firm, mottled, brown silt loam. The substratum is firm, yellowish brown silt loam to a depth of 60 inches or more.

Included with this soil in mapping, near Burlingham, are about 65 acres of soils that have a clayey subsoil and a clayey substratum. Also included are small areas of moderately well drained Scio soils and somewhat poorly drained Wallington soils. Wallington soils have a fragipan at a depth of 12 to 24 inches. Also included, along major streams and waterways, are moderately well drained Philo and Bash soils, and Fluvaquents and Udifluvents, which are subject to flooding. Also included are small areas of Chenango and Riverhead soils. Riverhead soils are well drained and have a sandy surface layer. Chenango soils are well drained and have a gravelly surface layer and a gravelly subsoil. The included soils are 1 to 3 acres in size and make up 15 to 20 percent of the map unit.

The seasonal high water table in this Raynham soil is at a depth of 0.5 foot to 2 feet in fall, winter, and spring. Permeability is moderate in the surface layer, moderate or moderately slow in the subsoil, and slow in the substratum. The available water capacity is high. Surface runoff is slow. Reaction ranges from strongly acid to neutral in the surface layer and the subsoil.

Most areas of this soil are idle or have reverted to brush and forest. A small acreage is used for farming.

This soil is moderately well suited to crops. Where adequately drained, it is among the soils in the county that are best suited to food and fiber production. The seasonal high water table is the main limitation for

cultivated crops and permanent pasture. Subsurface tile drainage and installing diversions to intercept runoff and subsurface seepage from adjacent, higher areas help to remove excess surface water

Potential productivity of eastern white pine on this soil is high. The equipment limitation, seedling mortality, and windthrow hazard are severe because of the seasonal high water table.

The seasonal high water table, slow permeability, and potential frost action are severe limitations of this soil for building site development and sanitary facilities. In some areas the soil is subject to ponding.

This soil is in capability subclass IIIw.

Re—Red Hook sandy loam. This is a very deep, nearly level, somewhat poorly drained soil that formed in glacial outwash. It is in depressional areas on outwash plains, outwash fans, and old stream terraces. It is subject to rare flooding. Areas of the soil are irregular in shape and range from 5 to 50 acres or more in size. Slope ranges from 0 to 3 percent.

Typically, the surface layer is dark brown sandy loam about 7 inches thick. The subsoil, to a depth of about 38 inches, is mottled, yellowish brown and gray fine sandy loam and loam. The substratum is grayish brown very gravelly coarse sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of moderately well drained Scio soils and somewhat poorly drained Wallington soils. Wallington soils have a fragipan at a depth of about 18 inches. Also included, along major streams and waterways, are areas of moderately well drained Philo and Bash soils, and Fluvaquents and Udifluvents, which are subject to flooding. Also included are Chenango and Riverhead soils. Riverhead soils are well drained. Chenango soils are well drained to somewhat excessively drained. The included soils are 1 to 3 acres in size and make up 15 to 20 percent of the map unit.

The seasonal high water table in this Red Hook soil is at a depth of 0.5 foot to 1.5 feet in winter and early spring. Permeability is moderate in the upper part of the soil and moderate or moderately slow in the lower part. The available water capacity is moderate or low. Surface runoff is slow. Some areas of the soil are subject to rare flooding. If the soil has not been limed, it ranges from extremely acid to moderately acid in the surface layer, very strongly acid or strongly acid in the subsoil, and very strongly acid to moderately acid in the substratum.

Most areas of this soil are idle or are covered by brush or forest. Small areas are used for farming.

This soil is moderately well suited to cultivated crops. The seasonal high water table severely limits the choice of crops and restricts farming operations. Where adequately drained, it is among the soils in the county that are best suited to food and fiber production. Extensive drainage is generally needed if the soil is cultivated. Subsurface tile drainage, installing diversions to intercept runoff, and subsurface seepage from adjacent, higher areas generally help to remove excess water.

Potential productivity of red maple on this soil is moderate. The equipment limitation, seedling mortality, and windthrow hazard are moderate because of the seasonal high water table.

Flooding, the seasonal high water table, slow permeability, and potential frost action are severe limitations of the soil for building site development and as sites for sanitary facilities.

This soil is in capability subclass IIIw.

RhA—Riverhead sandy loam, 0 to 3 percent slopes. This is a nearly level, very deep, well drained soil on level parts of glacial outwash plains, valley trains, and outwash terraces. Areas of the soil are irregular in shape or oval and range from 3 to 20 acres in size.

Typically, the surface layer is brown sandy loam about 6 inches thick. The subsoil is about 24 inches thick. It is yellowish brown sandy loam in the upper part and yellowish brown gravelly sandy loam in the lower part. The substratum is loose, yellowish brown gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of somewhat poorly drained Pompton soils. Also included are small areas of Chenango and Tunkhannock soils, which are more gravelly than this Riverhead soil. Also included, along major streams and rivers, are the less gravelly Valois, Unadilla, and Suncook soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The water table in this Riverhead soil is generally not above a depth of 60 inches. Permeability is moderately rapid in the surface layer and the subsoil and moderately rapid to very rapid in the substratum. The available water capacity is moderate. Surface runoff is slow. If the soil has not been limed, the surface layer and the subsoil are extremely acid to moderately acid.

Most areas of this soil are forest or idle. Small areas are used for cultivated crops, hay, or pasture.

This soil is well suited to intensive cropping. It is among the soils in the county that are best suited to food and fiber production. It warms up early in spring

and is easy to till. In some years droughtiness is a slight problem during dry periods in midsummer. Cover crops and crop residue returned to the soil will increase organic matter content and available water capacity.

This soil is well suited to pasture and hay. In some years new seedings are difficult to establish because of droughtiness. Stocking rates within carrying capacity and restricted grazing, especially during dry periods, will help to maintain higher quality pasture.

Potential productivity of sugar maple on this soil is moderate. There are no limitations to woodland use and management.

This soil is well suited to use as sites for dwellings and small commercial buildings. Potential frost action is a moderate limitation for local roads and streets. Moderately rapid to very rapid permeability and consequent excessive seepage are severe limitations on sites for sanitary facilities.

This soil in in capability subclass IIs.

RhB—Riverhead sandy loam, 3 to 8 percent slopes. This is a gently sloping, very deep, well drained soil on parts of glacial outwash plains, valley trains, and outwash terraces. Areas of the soil are irregular in shape or oval and range from 3 to 20 acres in size.

Typically, the surface layer is brown sandy loam about 6 inches thick. The subsoil is about 24 inches thick. It is yellowish brown sandy loam in the upper part and yellowish brown gravelly sandy loam in the lower part. The substratum is loose, yellowish brown gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of somewhat poorly drained Pompton soils. Also included are small areas of Chenango and Tunkhannock soils, which are more gravelly than this Riverhead soil. Also included, along major streams and rivers, are the less gravelly Valois, Unadilla, and Suncook soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The water table in this Riverhead soil is generally not above a depth of 60 inches. Permeability is moderately rapid in the surface layer and the subsoil and moderately rapid to very rapid in the substratum. The available water capacity is moderate. Surface runoff is slow or medium. Natural fertility is low. If the soil has not been limed, the surface layer and the subsoil are extremely acid to moderately acid.

Most areas of this soil are forest or idle. Small areas are used for cultivated crops, hay, or pasture.

This soil is well suited to intensive cropping. It is among the soils in the county that are best suited to food and fiber production. It warms up early in spring and is easy to till. In some years droughtiness is a slight problem during dry periods in midsummer. Erosion is a slight hazard on longer slopes. Conservation tillage and contour farming help to control erosion. Cover crops and crop residue returned to the soil will increase organic matter content and available water capacity.

This soil is suited to pasture and hay. In some years new seedings are difficult to establish because of droughtiness. Stocking rates within carrying capacity and restricted grazing, especially during dry periods, will help to maintain higher quality pasture.

Potential productivity of sugar maple on this soil is moderate. There are no limitations to woodland use and management.

This soil is well suited to use as sites for dwellings and small commercial buildings. Potential frost action is a moderate limitation for local roads and streets. Rapid permeability and seepage are severe limitations on sites for sanitary facilities.

This soil is in capability subclass IIs.

RhC—Riverhead sandy loam, 8 to 15 percent slopes. This is a strongly sloping, very deep, well drained soil on sides of outwash terraces and the lower parts of valley sides. Areas of the soil are irregular in shape or oval and range from 3 to 20 acres in size.

Typically, the surface layer is brown sandy loam about 6 inches thick. The subsoil is about 24 inches thick. It is yellowish brown sandy loam in the upper part and yellowish brown gravelly sandy loam in the lower part. The substratum is loose, yellowish brown gravelly loamy sand to a depth of 60 inches or more.

Included with this soil in mapping are small areas of very gravelly, excessively drained Otisville soils. Also included are small areas of Chenango and Tunkhannock soils, which are more gravelly than Riverhead soils. Also included, along some valley sides, are areas of the less gravelly Valois and Unadilla soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The water table in this Riverhead soil is generally not above a depth of 60 inches. Permeability is moderately rapid in the surface layer and the subsoil and moderately rapid to very rapid in the substratum. The available water capacity is moderate. Surface runoff is medium. Natural fertility is low. If the soil has not been limed, the surface layer and the subsoil are extremely acid to moderately acid.

Most areas of this soil are forest or idle. Small areas are used for cultivated crops, hay, and pasture.

This soil is moderately suited to farming. Slope and

the erosion hazard limit intensive cropping. The soil warms up early in spring and is easy to till. Droughtiness is a problem during dry periods in midsummer. Conservation tillage and contour farming help to control erosion. Cover crops, a higher proportion of sod crops in rotation, and crop residue returned to the soil help to control erosion and to increase the organic matter content and available water capacity.

This soil is suited to pasture and hay. In some years new seedings are difficult to establish because of droughtiness. Stocking rates within carrying capacity and restricted grazing, especially during dry periods, help to maintain pasture and to control erosion.

Potential productivity of sugar maple on this soil is moderate. There are no limitations to woodland use and management.

Slope is a moderate limitation to use of this soil as sites for dwellings, small commercial buildings, and local roads and streets. Rapid permeability and seepage are severe limitations on sites for sanitary facilities.

This soil is in capability subclass IIIe.

SaB—Scio silt loam, 2 to 6 percent slopes. This is a very deep, gently sloping, moderately well drained soil in flat areas of terraces, on old alluvial fans, and on silt-mantled plains on uplands. Areas of the soil are commonly broad and irregular in shape and range from 5 to 15 acres in size.

Typically, the surface layer is dark brown silt loam about 6 inches thick. The subsoil, to a depth of 29 inches, is mottled, yellowish brown and brown silt loam. The substratum is a firm or friable, brown and dark yellowish brown silt loam to a depth of 60 inches or more.

Included with this soil in mapping are areas of nearly level, wetter Red Hook, Alden, Raynham, and Wallington soils. Also included are areas of Raynham soils, which are similar to this Scio soil, but are somewhat poorly drained or poorly drained. Also included are areas of Red Hook soils, which are somewhat poorly drained and contain rock fragments. Also included are areas of Wallington soils, which have a dense layer, or fragipan, in the subsoil and are somewhat poorly drained. Also included are very poorly drained Alden soils.

The seasonal high water table in this Scio soil is at a depth of 1.5 to 2 feet in late winter and in spring. Surface runoff is slow or medium. Permeability is moderate in the surface layer and the subsoil and rapid or moderately rapid below. The available water capacity is high. Depth to bedrock is more than 60 inches. If the soil has not been limed, the surface layer and the subsoil range from moderately acid to very strongly acid.

Some areas of this soil have been cleared and are used for hay and corn. Most of the rest of the areas are forest or idle.

This soil is well suited to most cultivated crops grown in the region, including corn and small grains. It is among the soils in the county that are best suited to food and fiber production. The seasonal high water table is the main limitation to agricultural use. Erosion is a hazard. Cover crops and crop residue returned to the soil help to maintain organic matter content and to improve workability.

Potential productivity of northern red oak on this soil is moderately high. There are no limitations to woodland use and management.

The seasonal high water table is a moderate limitation to use of this soil as sites for dwellings without basements and small commercial buildings. The seasonal high water table is a severe limitation on sites for septic tank absorption fields and dwellings with basements. The seasonal high water table is a moderate limitation to recreation use.

This soil is in capability subclass IIe.

ScA—Scriba loam, 0 to 3 percent slopes, stony. This is a nearly level, very deep, somewhat poorly drained soil on flat parts of glaciated uplands or till plains. Stones 10 to 200 feet apart cover 0.01 to 0.1 percent of the surface. Areas of the soil are smooth or slightly concave. They are irregular in shape or oval and range from 3 to 20 acres in size.

Typically, the surface layer is covered by a layer of partly decomposed leaves and twigs about 2 inches thick. The surface layer is very dark gray loam about 6 inches thick. The subsurface layer is dark gray channery very fine sandy loam about 6 inches thick. The subsoil is 48 inches or more thick. In the upper part it is mottled, brown channery loam, and in the lower part it is a very firm and brittle, mottled, yellowish brown channery loam.

Included with this soil in mapping are small areas of moderately well drained Wurtsboro soils and poorly drained or very poorly drained Neversink soils. Also included, in the central part of the county, are small areas of moderately well drained Wellsboro soils and siltier Morris and Wallington soils. Also included are some areas of gently sloping soils and small areas of very stony or extremely stony soils. The included soils range to 3 acres in size and make up about 15 to 20 percent of the map unit.

Permeability in this Scriba soil is moderate or slow above the fragipan and slow in the fragipan. Surface runoff is slow. The seasonal high water table is at a depth of 0.5 foot to 1.5 feet and is perched above the fragipan in late winter and early spring. The available water capacity is low. If the soils have not been limed, the surface layer and the subsoil range from extremely acid to slightly acid. Depth to bedrock is generally 60 inches or more.

Most areas of this soil are forest or idle. A few small fields are used for pasture or hay.

This soil is moderately suited to cultivated crops. The seasonal high water table is a severe limitation to many farming operations and restricts the choice of crops. Stones interfere with tillage operations. It is suited to forage crops and pasture. Artificial drainage, including tile, open drains, and diversions to intercept water from higher areas, are needed if the soil is used for cultivated crops. Suitable outlets in most areas are difficult to establish.

Restricted grazing when the soil is too wet and overgrazing are the main concerns in pasture management. Reseeding mainly with water-tolerant forage crop plants is a suitable management practice. Stocking rates within carrying capacity and restricted grazing during wet periods help to maintain pasture.

Potential productivity of northern red oak on this soil is moderately high. The equipment limitation, seedling mortality, and windthrow hazard are moderate because of the seasonal high water table.

The seasonal high water table and potential frost action are severe limitations of this soil for building site development. The seasonal high water table and slow permeability are limitations on sites for septic tank absorption fields.

This soil is in capability subclass IIIw.

ScB—Scriba loam, 3 to 8 percent slopes, stony. This is a gently sloping, very deep, somewhat poorly drained soil on toe slopes and on parts of glaciated uplands and till plains. Stones, 10 to 200 feet apart, cover 0.01 to 0 1 percent of the surface. Areas of this soil are smooth or slightly concave. They are irregular in shape or oval and range from 3 to 20 acres in size.

Typically, the surface layer is covered by a layer of partly decomposed leaves and twigs about 2 inches thick. The surface layer is very dark gray loam about 6 inches thick. The subsurface layer is dark gray channery very fine sandy loam about 6 inches thick. The subsoil is 48 inches thick or more. In the upper part it is mottled, brown channery loam, and in the lower part it is very firm and brittle, mottled, yellowish brown channery loam.

Included with this soil in mapping are small areas of moderately well drained Wurtsboro soils and poorly drained or very poorly drained Neversink soils. Also included, in the central part of the county, are small areas of moderately well drained Wellsboro soils and siltier Morris and Wallington soils. Also included are some areas of stony, sloping soils and small areas of very stony or extremely stony soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

Permeability in this Scriba soil is moderate or slow above the fragipan and slow in the fragipan. Surface runoff is slow or medium. The seasonal high water table is at a depth of 0.5 foot to 1.5 feet and is perched above the fragipan in late winter and early spring. The available water capacity is low. If the soils have not been limed, the surface layer and the subsoil range from extremely acid to slightly acid. Depth to bedrock is generally 60 inches or more.

Most areas of this soil are forest or idle. A few small fields are used for pasture or hay.

This soil is suited to cultivated crops, but the seasonal high water table is a severe limitation to many farming operations and restricts the choice of crops. Stones interfere with tillage operations. It is suited to forage crops and pasture. Artificial drainage, including tile, open drains, and diversions to intercept water from higher areas, are needed if the soil is used for cultivated crops. Suitable outlets in most areas are difficult to establish.

Restricted grazing when the soil is too wet and overgrazing are the main concerns in pasture management. Reseeding mainly with water-tolerant forage crop plants is a suitable management practice. Stocking rates within carrying capacity and restricted grazing during wet periods help to maintain pasture.

Potential productivity of northern red oak on this soil is moderately high. The equipment limitation, seedling mortality, and windthrow hazard are moderate because of the seasonal high water table.

The seasonal high water table and potential frost action are severe limitations of this soil for building site development. The seasonal high water table and slow permeability are severe limitations on sites for septic tank absorption fields.

This soil is in capability subclass IIIw.

SeB—Scriba and Morris loams, gently sloping, extremely stony. This map unit consists of very deep,

somewhat poorly drained Scriba and Morris soils that formed in glacial till. These soils are mainly on till plains and on the lower parts of hillsides and partly in small drainageways. Some areas are Scriba soil, some are Morris soil, and some consist of both. The total acreage of the map unit is about 40 percent Scriba soil, 40 percent Morris soil, and 20 percent other soils. The soils have a dense, firm layer called a fragipan in the subsoil. Texture of the surface layer, excluding rock fragments, are silt loam, loam, or fine sandy loam. Stones and boulders that are 2 to 5 feet apart and more than 10 inches in diameter cover about 15 to 50 percent of the surface. Slopes are mostly smooth and range from 2 to 8 percent. Areas of these soils are irregular in shape and range from about 5 to 30 acres in size.

Typically, the surface layer of the Scriba soil is very dark gray loam about 6 inches thick. The subsurface layer is dark gray channery very fine sandy loam about 12 inches thick. The subsoil is 48 inches or more thick. In the upper part it is mottled, brown channery loam, and in the lower part it is very firm and brittle, mottled, yellowish brown channery loam.

Typically, the surface layer of the Morris soil is dark brown loam about 2 inches thick. The subsurface layer is reddish gray loam to a depth of 6 inches. The subsoil extends to a depth of 60 inches or more. In the upper part it is mottled, yellowish red and reddish brown gravelly loam. In the lower part it is dense, firm, reddish brown gravelly loam.

Included with these soils in mapping, in flatter areas or small depressions, are small areas of poorly drained and very poorly drained Neversink soils and very poorly drained Alden soils. Also included, in slightly higher areas, are small areas of moderately well drained Wellsboro and Wurtsboro soils. Also included are some areas that do not have large surface stones. The included soils range to 3 acres in size and make up about 20 percent of the map unit.

Permeability in the Morris soil is moderate above the fragipan and slow or very slow in the fragipan. Permeability in the Scriba soil is moderate or slow above the fragipan and slow in the fragipan. The seasonal high water table in both soils is perched above the dense, firm fragipan at a depth of 0.5 foot to 1.5 feet below the surface from late fall to early spring. Surface runoff is slow or medium. The available water capacity is low or moderate. Depth to bedrock is commonly more than 60 inches. If the soils have not been limed, the surface layer and the subsoil are very strongly acid to slightly acid in the Morris soil and extremely acid to slightly acid in the Scriba soil.

Most areas of these soils are forest or idle. Some areas are used for pasture.

These soils are not suitable for cultivation or hay because of large stones on the surface. The seasonal high water table is also a limitation to farming operations.

In some areas these soils can be used for limited pasture, but stones interfere with needed applications of lime and fertilizer. Reseeding is generally not practical. Restricted grazing during wet periods will help to maintain better quality pasture.

Potential productivity of northern red oak is moderately high on the Scriba soil and moderate on the Morris soil. The equipment limitation, seedling mortality, and windthrow hazard are moderate because of the seasonal high water table and stoniness.

The seasonal high water table is a severe limitation to use of these soils as sites for dwellings and small commercial buildings. The seasonal high water table and potential frost action are severe limitations for local roads and streets. The seasonal high water table and slow permeability are severe limitations on sites for septic tank absorption fields. Some areas can be developed for habitat for wildlife.

These soils are in capability subclass VIIs.

Sn—Suncook fine sandy loam. This is a nearly level, very deep, excessively drained soil that formed in recent, sandy, alluvial deposits. It is in nearly level areas on flood plains and in areas adjacent to major streams and rivers. In most years it is subject to occasional flooding from March through May. Areas of the soil are narrow to broad, and irregular in shape, and range from 5 to 25 acres in size. Slope ranges from 0 to 2 percent.

Typically, the surface layer is dark reddish gray fine sandy loam about 8 inches thick. The substratum extends to a depth of 60 inches or more. It is friable to loose, dark brown and dark reddish brown loamy sand and extremely gravelly loamy coarse sand.

Included with this soil in mapping are small areas of moderately well drained Philo soils and somewhat poorly drained Bash soils. The Suncook soil is sandier than Philo and Bash soils. Also included are small areas of well drained Pope, Barbour, and Tunkhannock soils. Pope and Barbour soils have less sand and are not as droughty as the Suncook soil. Tunkhannock soils have a gravelly surface layer and a gravelly subsoil. Also included are poorly drained and very poorly drained Fluvaquents and Udifluvents that are subject to frequent flooding. The included soils range to 3 acres in

size and make up about 20 percent of the map unit.

The seasonal high water table in this Suncook soil is at a depth of 3 to 6 feet in winter and spring. Permeability is rapid. The available water capacity is low. Surface runoff is slow. The soil is subject to flooding during periods of high rainfall or snowmelt, or both, in early spring. In most areas it essentially does not have rock fragments, but some areas have gravel, which increases in volume with depth. If the soil has not been limed, it ranges from very strongly acid to slightly acid.

Most areas are along major streams and rivers and have reverted to brush and forest. A small acreage is used for limited amounts of pasture.

This soil is moderately suited to pasture and other crops grown in the region. Droughtiness is a problem in midsummer in most years. In some areas choice of plant species is limited. Soil fertility is low. Cover crops and crop residue incorporated into the soil will increase organic matter content and available water capacity. Stocking rates within carrying capacity should be maintained when the soil is used for pasture.

Potential productivity of eastern white pine on this soil is high. The erosion hazard, the equipment limitation, and windthrow hazard are slight. Weed competition and droughtiness, however, are severe limitations for young seedlings.

Flooding is a severe limitation to use of this soil as sites for most sanitary facilities, and for building site development. Shallow excavations are subject to bank cave-ins. If the soil is used for septic tank absorption fields, ground water contamination is a hazard.

This soil is in capability subclass IIIs.

So—Suny fine sandy loam. This is a very deep, nearly level, poorly drained or very poorly drained soil on flat or slightly depressed parts of glaciated uplands. Areas of the soil are smooth or slightly concave. They are irregular in shape or oval and about 3 to 10 acres in size. Slope ranges from 0 to 3 percent.

Typically, the surface layer is covered with a thin, black organic layer. The surface layer is dark reddish brown fine sandy loam about 2 inches thick. The subsurface layer is grayish brown sandy loam about 2 inches thick. The subsoil, to a depth of 17 inches, is light brownish gray and brown sandy loam and gravelly sandy loam. The substratum is firm, reddish brown gravelly sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of better drained Onteora and Willowemoc soils on slightly higher parts of the landscape. Also included, at the center of depressed areas, are some areas of very poorly drained, organic Greenwood and Ossipee soils. Also included are common, small areas of stony or very stony soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

Permeability in this Suny soil is moderate in the surface layer and slow in the subsoil and the substratum. Surface runoff is very slow. The seasonal high water table is at or near the surface from late fall to midspring. The available water capacity is low. The soil ranges from extremely acid to strongly acid.

Most areas of this soil are wooded, but a few small areas are covered with brush or native, nonwoody plants.

This soil is poorly suited to crops and pasture. The main limitations are the seasonal high water table and cool climate. Extensive drainage is required if the soil is used for cultivated crops, but drainage outlets are commonly difficult to establish. The growing season is several weeks shorter than in parts of the county at lower elevations.

Potential productivity of red maple on this soil is moderate. The erosion hazard, at worst, is slight. The equipment limitation, seedling mortality, and windthrow hazard are all severe because of the seasonal high water table.

The seasonal high water table and slow permeability are severe limitations of this soil for most urban and recreation uses. High potential frost action is a severe limitation for local roads and streets.

This soil is in capability subclass IVw.

Sp—Suny fine sandy loam, very stony. This is a very deep, nearly level, poorly drained or very poorly drained soil on flat or slightly depressed parts of glaciated uplands. Stones more than 10 inches in diameter and about 5 to 30 feet apart cover 3 to 15 percent of the surface. Areas of the soil are smooth or slightly concave. They are irregular in shape or oval and about 3 to 10 acres in size. Slope ranges from 0 to 3 percent.

Typically, the surface layer is covered with a thin, black organic layer. The surface layer is dark reddish brown fine sandy loam about 2 inches thick. The subsurface layer is grayish brown sandy loam about 2 inches thick. The subsoil, to a depth of 17 inches, is light brownish gray and brown sandy loam and gravelly sandy loam. The substratum is firm, reddish brown gravelly sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of better drained Onteora and Willowemoc soils on slightly higher parts of the landscape. Also included, at the centers of depressed areas, are some areas of very

poorly drained, organic Greenwood and Ossipee soils. Also included are common, small areas of nonstony soils or very bouldery soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

Permeability in this Suny soil is moderate in the surface layer and slow in the subsoil and the substratum. Surface runoff is very slow. The seasonal high water table is at or near the surface from late fall to midspring. The available water capacity is low. The soil ranges from extremely acid to strongly acid.

Most areas of this soil are wooded, but a few small areas are covered with brush or native, nonwoody plants.

This soil, in its natural condition, is not suited to crops or pasture because of the seasonal high water table, stoniness, and cool climate. Stone removal and extensive drainage are required if the soil is used for cultivated crops; drainage outlets, however, are commonly difficult to establish. The growing season is several weeks shorter than in other parts of the county at lower elevations.

Potential productivity of red maple on this soil is moderate. The erosion hazard, at worst, is slight. The equipment limitation, seedling mortality, and windthrow hazard are all severe because of the seasonal high water table.

The seasonal high water table, excessive surface stones, and slow permeability are severe limitations of this soil for most urban and recreation uses. High potential frost action is a severe limitation for local roads and streets.

This soil is in capability subclass VIIs.

SrB—Swartswood gravelly loam, 3 to 8 percent slopes, stony. This is a very deep, gently sloping, well drained soil on hilltops and plateaus on uplands. Slopes are smooth and slightly convex. Areas of the soil are oval or elongated and range from about 3 to 25 acres in size, but areas of 5 to 10 acres are most common. Stones 10 inches or more in diameter and 10 to 200 feet apart cover 0.01 to 3 percent of the surface.

Typically, the surface layer is dark reddish brown gravelly loam about 1 inch thick. The subsoil extends to a depth of 60 inches or more. It is dark brown loam to a depth of about 10 inches and reddish brown gravelly loam and gravelly sandy loam to a depth of 26 inches. Below that, it is a firm, brittle layer, or fragipan, of reddish brown gravelly sandy loam and a few pockets of sandier material.

Included with this soil in mapping are small areas of Wurtsboro, Scriba, Cheshire, and Valois soils. The Swartswood soil is better drained than Wurtsboro and Scriba soils. Valois and Cheshire soils do not have a firm, brittle layer in the lower part of the subsoil. Also included, in the central part of the survey area, are some areas of siltier Lackawanna soils and wetter Wellsboro soils. Also included are small areas of very stony soils. The included soils range to 3 acres and make up about 15 percent of the map unit.

The seasonal high water table in this Swartswood soil is perched above the dense, firm layer in the subsoil, at a depth of 2.5 to 6 feet, in late fall and winter. Permeability of this soil is moderate above the fragipan and slow or moderately slow in the fragipan. Surface runoff is slow or medium. The available water capacity is moderate. Depth to bedrock is generally more than 60 inches. If the soil has not been limed, it is strongly acid to extremely acid throughout.

Areas of this soil are used for farming, as woodland, for recreation, and as building sites, or they are idle.

This soil is well suited to farming, but rock fragments in the soil and surface stones hinder intensive cultivation. Contour farming or conservation tillage and cover crops help to control erosion and to maintain soil productivity.

This soil is suited to pasture and hay. There are few or no limitations, except in scattered areas the surface is very stony or bouldery.

Potential productivity of northern red oak on this soil is moderately high. There are no limitations to woodland use and management.

The seasonal high water table and potential frost action are moderate limitations to use of this soil for building site development. Slow permeability is a severe limitation on sites for septic tank absorption fields. During construction minimum site disturbance and temporary cover crops help to control erosion.

This soil is in capability subclass IIe.

SrC—Swartswood gravelly loam, 8 to 15 percent slopes, stony. This is a very deep, strongly sloping, well drained soil on the sides and tops of hills. Slopes are smooth or convex. Stones 10 inches in diameter and about 10 to 200 feet apart cover 0.01 to 3 percent of the surface. Areas of the soil are oval or elongated. They range from 5 to 40 acres in size, but areas of 10 to 15 acres are most common.

Typically, the surface layer is dark reddish brown gravelly loam about 1 inch thick. The subsoil extends to a depth of 60 inches or more. It is dark brown loam to a depth of about 10 inches and reddish brown gravelly loam and gravelly sandy loam to a depth of 26 inches. Below that, it is a firm, brittle layer, or fragipan, of

reddish brown gravelly sandy loam and a few pockets of sandier material.

Included with this soil in mapping are small areas of Wurtsboro, Scriba, Cheshire, and Valois soils. Swartswood soils are better drained than Wurtsboro and Scriba soils. Valois and Cheshire soils do not have a firm, brittle layer in the lower part of the subsoil. Also included, in the central part of the survey area, are some areas of siltier Lackawanna soils and wetter Wellsboro soils. Also included are small areas of soils that have very stony soils. The included soils range to 3 acres and make up about 15 percent of the map unit.

Permeability in this Swartswood soil is moderate to a depth of 26 inches and slow or moderately slow below that depth. The seasonal high water table is perched above the firm, brittle layer in the subsoil for short periods in winter and early spring. Surface runoff is medium. The available water capacity is moderate. Depth to bedrock is generally more than 60 inches. If the soil has not been limed, it is strongly acid to extremely acid throughout.

Areas of this soil are used for farming, as woodland, for recreation, and as building sites, or they are idle.

This soil is moderately suited to farming, but in some areas slope, rock fragments in the soil, and surface stones hinder cultivation. Diversions or terraces can help to reduce runoff and to control erosion. Conservation tillage and cover crops also help to maintain soil productivity and to control erosion.

This soil is suited to pasture and hay. There are few or no limitations, except in some areas surface stones hinder some farm operations. Stocking rates within grazing capacity prevent overgrazing and help to control erosion.

Potential productivity of northern red oak on this soil is moderately high. There are no limitations to woodland use and management.

Slope, the seasonal high water table, and moderate potential frost action are moderate limitations of this soil for most building site developments. Slow permeability is a severe limitation on sites for septic tank absorption fields. During construction minimum site disturbance and temporary cover crops help to control erosion.

This soil is in capability subclass IIIe.

SrD—Swartswood gravelly loam, 15 to 25 percent slopes, stony. This is a very deep, moderately steep, well drained soil on the sides of hills. Slopes are smooth or slightly convex. Areas are oval or elongated and range from about 5 to 35 acres in size, but areas of 5 to 15 acres are most common. Stones 10 or more inches in diameter and 10 to 200 feet apart cover 0.01 to 3 percent of the surface.

Typically, the surface layer is dark reddish brown gravelly loam about 1 inch thick. The subsoil extends to a depth of 60 inches or more. It is dark brown loam to a depth of about 10 inches and reddish brown gravelly loam and gravelly sandy loam to a depth of 26 inches. Below that, it is a firm, brittle layer, or fragipan, of reddish brown gravelly sandy loam and a few pockets of sandier material.

Included with this soil in mapping are small areas of Wurtsboro, Valois, Cheshire, and Lordstown soils. Swartswood soils are better drained than Wurtsboro soils. Valois and Cheshire soils do not have a firm, brittle layer in the lower part of the subsoil. Swartswood soils are deeper than Lordstown soils. Also included, in the central part of the survey area, are areas of siltier Lackawanna soils and wetter Wellsboro soils. Also included are small areas of very stony soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

Permeability in this Swartswood soil is moderate to a depth of 26 inches and slow or moderately slow below that depth. The seasonal high water table is perched above the firm, brittle layer in the subsoil for short periods in winter and early spring. Surface runoff is rapid. The available water capacity is moderate. Depth to bedrock is generally more than 60 inches. If the soil has not been limed, the soil is strongly acid to extremely acid throughout.

Areas of this soil are used for pasture, hayland, woodland, and recreation, or they are idle.

This soil is poorly suited to cultivated crops because of slope. If the soil is cultivated, extensive measures are needed both to control erosion and to reduce runoff.

This soil is suited to pasture and hay. In some areas slope and stones on the surface are limitations for hayland. Stocking rates within carrying capacity prevent overgrazing and help to maintain a permanent sod cover and to control erosion.

Potential productivity of northern red oak on this soil is moderately high. Slope is a moderate limitation for equipment use.

Slope and the seasonal high water table are severe limitations to use of this soil for building site development. Slow permeability is a severe limitation on sites for septic tank absorption fields. During construction, minimum site disturbance and terraces, diversions, and temporary cover crops help to control erosion.

This soil is in capability subclass IVe.

StE—Swartswood and Lackawanna soils, 25 to 35 percent slopes, stony. This map unit consists of very deep, well drained soils on steep hillsides on uplands and on the sides of ravines or small valleys along streams. Some areas are Swartswood soils, some areas are Lackawanna soils, and some areas consist of both. The total acreage of the map unit is about 40 percent Swartswood soils, 40 percent Lackawanna soils, and 20 percent other soils. These soils have a dense, firm layer called a fragipan in the subsoil. Areas of the soils are long and narrow and range from 5 to 25 acres in size. Stones 10 or more inches in diameter and 10 to 200 feet apart cover 0.01 to 3 percent of the surface.

Typically, the surface layer of the Swartswood soil is covered with a layer of black organic litter about 2 inches thick. The surface layer is dark reddish brown gravelly loam about 1 inch thick. The subsoil extends to a depth of 60 inches or more. It is dark brown loam to a depth of 10 inches and reddish brown gravelly loam and gravelly sandy loam to a depth of 26 inches. Below that, it is a firm, brittle layer, or fragipan, of reddish brown gravelly sandy loam and a few pockets of sandier material.

Typically, the surface layer of the Lackawanna soil is black organic litter about 2 inches thick. The surface layer is brown channery loam about 3 inches thick. The subsoil in the upper part, to a depth of 32 inches, is reddish brown channery loam. In the lower part, to a depth of 60 inches or more, it is a dense layer, or fragipan, of reddish brown channery loam.

Included with these soils in mapping, in flatter areas, are small areas of Wellsboro and Wurtsboro soils. Also included are small areas of Lordstown and Oquaga soils that have bedrock 20 to 40 inches below the surface. Also included are some small areas of Valois and Cheshire soils, which do not have a fragipan. The included soils make up about 20 percent of the map unit and range to 3 acres in size.

Permeability in the Swartswood and Lackawanna soils is moderate in the surface layer and the upper part of the subsoil and slow in the lower part. The seasonal high water table is perched above the dense fragipan, at a depth of 2.5 to 6 feet below the surface, in early spring or during wet periods in the rest of the year. In both soils the depth to the fragipan is generally 24 to 36 inches. Depth to bedrock is more than 60 inches. The available water capacity is moderate in both soils. Surface runoff is very rapid. If the soils have not been limed, the surface layer and the subsoil are strongly acid to extremely acid in the Swartswood soils and very strongly acid or strongly acid in the Lackawanna soils.

Some areas of the soils in this map unit have been cleared and are used for pasture. Most areas are idle or wooded.

These soils are not suited to cultivation and are poorly suited to use as hayland because of steep slopes, the erosion hazard, and scattered stones.

These soils can be used for limited pasture, but needed applications of lime and fertilizer are very difficult to apply because of slope. Restricted grazing and stocking rates within carrying capacity prevent overgrazing and help to control erosion.

Potential productivity of northern red oak on these soils is moderately high. Slope is a moderate limitation to equipment use.

Steepness of slope is a severe limitation of these soils for building site development. Slow permeability in the subsoil is a severe limitation on sites for septic tank absorption fields. Erosion is a severe hazard if the vegetative cover is disturbed. Some areas have potential for some recreation uses or can be developed for use as habitat for wildlife.

These soils are in capability subclass VIe.

SwE—Swartswood and Lackawanna soils, steep, very stony. This map unit consists of very deep, well drained soils that formed in glacial till on the sides of small valleys and ravines along streams and steep hillsides on uplands. Some areas are Swartswood soils, some areas are Lackawanna soils, and some areas consist of both. The total acreage of the map unit is about 40 percent Swartswood soils, 40 percent Lackawanna soils, and 20 percent other soils. Texture of the surface layer, excluding stones, is gravelly sandy loam to loam. Stones more than 10 inches in diameter and about 5 to 30 feet apart cover 3 to 15 percent of the surface. These soils have a dense, firm fragipan. Areas of these soils are elongated and irregular in shape. They range from about 5 to 75 acres in size, but areas of 10 to 50 acres are most common. Slopes range from 15 to 35 percent.

Typically, the surface layer of the Swartswood soils is covered with a layer of black organic litter about 2 inches thick. The surface layer is dark reddish brown gravelly loam about 1 inch thick. The subsoil extends to a depth of 60 inches or more. It is dark brown loam to a depth of 10 inches and reddish brown gravelly loam and gravelly sandy loam to a depth of 26 inches. Below that, it is a firm, brittle layer, or fragipan, of reddish brown gravelly sandy loam and a few pockets of sandier material.

Typically, the surface layer of the Lackawanna soils is black organic litter about 2 inches thick. The surface

layer is brown channery loam about 3 inches thick. The subsoil in the upper part, to a depth of 32 inches, is reddish brown channery loam. In the lower part, to a depth of 60 inches or more, it is a dense layer, or fragipan, of reddish brown channery loam.

Included with these soils in mapping, in flatter areas, are small areas of Wellsboro and Wurtsboro soils. Also included are small areas of Lordstown and Oquaga soils that have bedrock 20 to 40 inches below the surface. Also included are some small areas of Valois and Cheshire soils, which do not have a fragipan. Also included are common areas of soils that have fewer surface stones or that have scattered, large boulders on the surface. The included soils make up as much as 20 percent of the map unit and range to 3 acres in size.

Permeability in the Swartswood and Lackawanna soils is moderate in the surface layer and the upper part of the subsoil and slow in the lower part. The seasonal high water table is perched above the dense fragipan at a depth of 2.5 to 6 feet below the surface in early spring or during wet periods during the rest of the year. In both soils depth to the fragipan is generally 24 to 36 inches. Depth to bedrock is more than 60 inches. The available water capacity is moderate. Surface runoff is very rapid. If the soils have not been limed, the surface layer and the upper part of the subsoil are strongly acid to extremely acid in the Swartswood soils and very strongly acid or strongly acid in the Lackawanna soils.

A few areas of the soils in this map unit have been cleared and are used for pasture. Most areas are wooded.

Large stones and steep slopes make cultivation or other farming operations with machinery impractical on these soils. Some areas can be used for limited pasture, but restricted grazing prevents destruction of the sod cover and helps to control erosion.

Potential productivity of northern red oak on these soils is moderately high. Slope is a moderate limitation to use of equipment.

Steep slopes are a severe limitation to use of these soils for building site development. Slow permeability in the fragipan is a severe limitation on sites for septic tank absorption fields. Large stones on the surface and in the soils interfere with building site development.

Potential of these soils is fair or good for some types of habitat for wildlife.

These soils are in capability subclass VIIe.

SwF—Swartswood and Lackawanna soils, very steep, very stony. This map unit consists of very deep, well drained soils that formed in glacial till on very steep valley sides and very steep hillsides on uplands. Some areas are Swartswood soils, some areas are Lackawanna soils, and some areas consist of both. The total acreage of the map unit is about 40 percent Swartswood soils, 40 percent Lackawanna soils, and 20 percent other soils. Texture of the surface layer, excluding stones, is gravelly sandy loam to loam. Stones more than 10 inches in diameter and about 5 to 30 feet apart cover 3 to 15 percent of the surface. These soils have a dense, firm fragipan. Areas of these soils are long and relatively narrow. They range from about 5 to 35 acres in size, but most areas are 10 to 20 acres. Slopes range from 35 to about 50 percent.

Typically, the surface layer of the Swartswood soils is covered with a layer of black organic litter about 2 inches thick. The surface layer is dark reddish brown gravelly loam about 1 inch thick. The subsoil extends to a depth of 60 inches or more. It is dark brown loam to a depth of 10 inches and reddish brown gravelly loam and gravelly sandy loam to a depth of 26 inches. Below that, it is a firm, brittle layer, or fragipan, of reddish brown gravelly sandy loam and a few pockets of sandier material.

Typically, the surface layer of the Lackawanna soils is black organic litter about 2 inches thick. The surface layer is brown channery loam about 3 inches thick. The subsoil in the upper part, to a depth of 32 inches, is reddish brown channery loam. In the lower part, to a depth of 60 inches or more, it is a dense layer, or fragipan, of reddish brown channery loam.

Included with these soils in mapping are small areas of shallow Arnot soils and moderately deep Lordstown and Oquaga soils. Also included are some small areas of Valois and Cheshire soils, which do not have a dense layer in the subsoil. Also included are common areas of soils that are stony or nonstony. The included soils range to 3 acres in size and make up as much as 20 percent of the map unit.

Permeability in the Swartswood and Lackawanna soils is moderate in the surface layer and the upper part of the subsoil and slow in the lower part. The seasonal high water table is perched above the dense fragipan, at 2.5 to 6 feet below the surface, for brief periods during wet weather. In both soils depth to the fragipan is generally 24 to 36 inches. Depth to bedrock is more than 60 inches. The available water capacity is moderate. Surface runoff is very rapid. The surface layer and the upper part of the subsoil are strongly acid to extremely acid in the Swartswood soils and very strongly acid or strongly acid in the Lackawanna soils.

Most areas of these soils are forest. These soils are not suited to farming because of stones and very steep slopes.

Potential productivity of northern red oak on these soils is moderately high. Erosion is a moderate hazard. Slope is a severe limitation to use of equipment.

Very steep slopes are a severe limitation of these soils for building site development. Slow permeability and slope are severe limitations on sites for septic tank absorption fields. Large stones on the surface and in the soil are limitations for most types of building site development. Areas of these soils are suited to woodland use or to use as habitat for wildlife.

These soils are in capability subclass VIIe.

TaB—Torull-Rock outcrop complex, 1 to 5 percent slopes. This map unit consists of shallow, somewhat poorly drained or poorly drained Torull soil and areas of Rock outcrop on benches, steps, and nearly flat hilltops on bedrock-controlled uplands. It is about 60 percent Torull soil, about 20 percent Rock outcrop, and about 20 percent other soils. Areas of the Torull soil are smooth. Areas of the map unit range from small and oval to narrow strips and range from 3 to 10 acres in size. The Torull soil and areas of Rock outcrop are in such an intricate pattern that they could not be separated at the scale selected for mapping.

Typically, the surface layer of the Torull soil is covered by black, partly decomposed organic material about 2 inches thick. The surface layer is very dark gray silt loam about 1 inch thick. The subsurface layer is gray sandy loam about 7 inches thick. The subsoil is mottled, brown fine sandy loam to a depth of about 16 inches. Hard, grayish brown sandstone bedrock is below a depth of 16 inches.

Included with this complex in mapping are areas of somewhat poorly drained or poorly drained soils that have bedrock at a depth of 20 to 40 inches and areas of very deep Suny and Onteora soils. Also included are some areas of stony or bouldery soils. The included soils range to about 3 acres in size and make up about 20 percent of the map unit.

Permeability in this Torull soil is moderate. Surface runoff is slow. The seasonal high water table is at a depth of 0.5 to 1 foot from late fall to late spring. The available water capacity is very low or low. Depth to bedrock is 10 to 20 inches. The surface layer and the subsoil are very strongly acid or strongly acid.

A few small areas of this map unit are used for pasture, but most areas are wooded or covered by brush or native, nonwoody plants.

This Torull soil is not suitable for cultivated crops because of the seasonal high water table, shallow depth to bedrock, and rock outcrops. It can be used for some pasture, but the seasonal high water table limits production. Restricted grazing when the soil is too wet damages the sod cover.

Potential productivity of red maple on this Torull soil is moderate. Erosion is a slight hazard, but the equipment limitation, seedling mortality, and windthrow hazard are all severe because of the seasonal high water table. Rock outcrops cannot be used as woodland.

The seasonal high water table and shallow depth to bedrock are severe limitations of this Torull soil for building site development and as sites for sanitary facilities. Areas of rock outcrop interfere with development. Potential frost action is high.

This soil is in capability subclass VIs.

TeB—Tuller-Rock outcrop complex, 1 to 5 percent slopes. This map unit consists of shallow, somewhat poorly drained and poorly drained Tuller soil and areas of Rock outcrop in gently sloping areas on nearly flat hilltops in bedrock-controlled areas, in narrow strips bordering rock faces. It is 60 percent Tuller soil, 20 percent areas of Rock outcrop, and 20 percent other soils. The Tuller soil and Rock outcrop are in oval areas or in narrow strips, and range from about 3 to 10 acres in size. They are in such an intricate pattern that they could not be separated at the scale selected for mapping.

Typically, the surface layer of the Tuller soil is covered with black organic material about 1 inch thick. The surface layer is very dark grayish brown very fine sandy loam about 4 inches thick. The subsoil is gray fine sandy loam about 7 inches thick. Hard, gray sandstone bedrock is at a depth of 11 inches.

Included with this complex in mapping are areas of very deep, very poorly drained Alden soils and very deep, poorly drained or very poorly drained Neversink soils. Also included are areas of very deep, somewhat poorly drained Scriba and Morris soils. Also included are small areas of well drained, shallow Arnot soils and moderately deep Oquaga and Lordstown soils. Also included are some areas of moderately deep, somewhat poorly drained or poorly drained soils and areas of very stony or extremely stony soils. The included soils range to about 3 acres in size, and make up about 20 percent of the map unit.

The seasonal high water table in the Tuller soil is at a depth of 0.5 to 1 foot most of the year. Runoff is slow. Permeability is moderate in the surface layer and slow or moderately slow in the subsoil. The available water capacity is very low or low. Depth to bedrock is 10 to 20 inches. The surface layer ranges from extremely acid to

moderately acid, and the subsoil is strongly acid or very strongly acid.

Some areas of the Tuller soil are used for pasture, but most areas are idle or forest.

The Tuller soil is suitable for use as limited pasture, woodland, or habitat for wildlife. The seasonal high water table, scattered rock outcrops, and shallowness of the soil are severe limitations for most agricultural uses. Grazing when the soil is too wet damages the sod cover.

Potential productivity of red maple on the Tuller soil is moderate. Windthrow is a hazard because of the shallow rooting depth and the seasonal high water table. The equipment limitation and seedling mortality are severe. Rock outcrops cannot be used as woodland.

Shallow soil, rock outcrops, and the seasonal high water table are severe limitations of the Torull soil for building site development and as sites for sanitary facilities. High potential frost action is a limitation for local roads and streets. Rock outcrops are not suited to building site development.

The Tuller soil is in capability subclass VIs.

TkA—Tunkhannock gravelly loam, 0 to 3 percent slopes. This is a very deep, nearly level, well drained or somewhat excessively drained soil on outwash terraces. Areas of the soil are smooth or slightly undulating. They are irregular in shape or elongated and range from 3 to 20 acres in size.

Typically, the surface layer is dark reddish gray gravelly loam about 6 inches thick. The subsoil, to a depth of 38 inches, is brown very gravelly sandy loam and reddish brown very gravelly very fine sandy loam. The substratum is loose reddish brown sand and gravel to a depth of 60 inches or more.

Included with this soil in mapping are small areas of soils that are similar to this Tunkhannock soil but are moderately well drained or somewhat poorly drained. Also included, adjacent to flood plains, are small areas of Barbour and Suncook soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Tunkhannock soil is at a depth of more than 6 feet. The available water capacity is moderate. Surface runoff is slow. Permeability is moderately rapid in the surface layer and the subsoil and rapid or moderately rapid in the substratum. Depth to bedrock is more than 60 inches. In some areas where the soil is next to streams, it is subject to brief flooding during periods of very high water. Gravel or cobbles are common in the surface layer and increase in volume in the subsoil. If the soil has not been limed, the surface layer and the subsoil are extremely acid to moderately acid.

In most areas this soil is used for cultivated crops, forage crops, and pasture (fig. 12). Some areas are idle or woodland.

This soil is well suited to intensive cropping, but coarse fragments interfere with some tillage operations and wear down equipment more than normal. It is among the soils in the county that are best suited to food and fiber production. Droughtiness is a problem during periods of dry weather in midsummer. Green manure crops and crop residue returned to the soil help to improve the organic matter content and the available water capacity.

This soil is well suited to pasture and hay. In some years new seedings are difficult to establish because of droughtiness. Stocking rates within carrying capacity and restricted grazing, especially during dry periods, help to maintain the pasture.

Potential productivity of northern red oak on this soil is moderately high. There are no limitations to woodland use and management.

The limitations are slight to use of this soil as sites for dwellings and small commercial buildings. Some included areas along streams are subject to rare flooding. Seepage and poor filtering of the effluent are severe limitations on sites for sanitary facilities. If the soil is used as sites for sanitary facilities, ground water contamination is a hazard.

This soil is in capability subclass IIs.

TkB—Tunkhannock gravelly loam, 3 to 8 percent slopes. This is a very deep, gently sloping, well drained to somewhat excessively drained soil on parts of outwash terraces and small knolls along valley sides. Areas of the soil are smooth or slightly undulating. They are irregular or elongated in shape and range from 3 to 15 acres in size.

Typically, the surface layer is dark reddish gray gravelly loam about 6 inches thick. The subsoil, to a depth of 38 inches, is brown very gravelly sandy loam and reddish brown very gravelly very fine sandy loam. The substratum is loose reddish brown sand and gravel to a depth of 60 inches or more.

Included with this soil in mapping are small areas of soils that are similar to this Tunkhannock soil but are moderately well drained or somewhat poorly drained. Also included, adjacent to flood plains, are small areas of Barbour and Suncook soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

Figure 12.—An area of Tunkhannock gravelly loam, 0 to 3 percent slopes, in the foreground used for forage. In the middleground the Wellsboro and Morris soils are typically used as hayland and pasture interspersed with woodland.

The seasonal high water table in this Tunkhannock soil is at a depth of more than 6 feet. The available water capacity is moderate. Surface runoff is slow. Permeability is moderately rapid in the surface layer and the subsoil and rapid or moderately rapid in the substratum. Depth to bedrock is more than 60 inches. Gravel or cobbles are common in the surface layer and increase in volume in the subsoil. If the soil has not been limed, the surface layer and the subsoil are extremely acid to moderately acid.

In most areas this soil is used for cultivated crops, forage crops, and pasture. Some areas are idle or woodland.

This soil is well suited to intensive cropping, but coarse fragments interfere with some tillage operations and wear down equipment more than normal. It is among the soils in the county that are best suited to food and fiber production. Erosion is a slight hazard on some longer slopes. Droughtiness is a problem during periods of dry weather in midsummer. Green manure crops, cover crops, and crop residue returned to the soil help to improve the organic matter content, to control erosion, and to increase available water capacity.

This soil is well suited to pasture and hay. In some years new seedings are difficult to establish because of droughtiness. Stocking rates within carrying capacity and restricted grazing, especially during dry periods, help to maintain the pasture.

Potential productivity of northern red oak on this soil is moderately high. There are few or no limitations to

woodland use and management.

The limitations are slight to use of this soil as sites for dwellings. Seepage and poor filtering are severe limitations on sites for sanitary facilities. If the soil is used as sites for sanitary facilities, ground water contamination is a hazard.

This soil is in capability subclass IIs.

TkC—Tunkhannock gravelly loam, 8 to 15 percent slopes. This is a very deep, strongly sloping, well drained or somewhat excessively drained soil on the sides of outwash terraces and small knolls along valley sides. Areas of the soil are smooth or slightly convex. They are irregular or elongated in shape and range from 3 to 15 acres in size.

Typically, the surface layer is dark reddish gray gravelly loam about 6 inches thick. The subsoil, to a depth of 38 inches, is brown very gravelly sandy loam and reddish brown very gravelly very fine sandy loam. The substratum is loose reddish brown sand and gravel to a depth of 60 inches or more.

Included with this soil in mapping are small areas of similar soils that are moderately well drained. Also included are small areas of Cheshire soils along valley sides. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Tunkhannock soil is at a depth of more than 6 feet. The available water capacity is moderate. Surface runoff is medium. Permeability is moderately rapid in the surface layer and the subsoil and rapid or moderately rapid in the substratum. Depth to bedrock is more than 60 inches. Gravel or cobbles are common in the surface layer and increase in volume in the subsoil. If the soil has not been limed, the surface layer and the subsoil are extremely acid to moderately acid.

In most areas this soil is used for cultivated crops, forage crops, and pasture. Some areas are idle or woodland.

This soil is moderately suited to cultivation, but erosion is a hazard if the vegetative cover is disturbed. Coarse fragments interfere with some tillage operations and cause greater than normal wear of equipment. Droughtiness is a problem during periods of dry weather in midsummer. Green manure crops, sod crops in rotation, cover crops, and crop residue returned to the soil help to improve the organic matter content, to control erosion, and to increase available water capacity.

This soil is suited to pasture and hay. In some years new seedings are difficult to establish because of droughtiness. Stocking rates within carrying capacity and restricted grazing, especially during dry periods, help to maintain the pasture and to control erosion.

Potential productivity of northern red oak on this soil is moderately high. There are no limitations to woodland use and management.

Slope is a moderate limitation to use of this soil as sites for dwellings and small commercial buildings. Seepage, poor filtering, and slope are severe limitations on sites for sanitary facilities. If the soil is used as sites for sanitary facilities, ground water contamination is a hazard.

This soil is in capability subclass IIIe.

TkD—Tunkhannock gravelly loam, 15 to 25 percent slopes. This is a very deep, moderately steep, well drained to somewhat excessively drained soil on the sides of outwash terraces and small knolls along valley sides. Areas of the soil are smooth or slightly convex. They are irregular or elongated in shape and range from 3 to 15 acres in size.

Typically, the surface layer is dark reddish gray gravelly loam about 6 inches thick. The subsoil, to a depth of 38 inches, is brown very gravelly sandy loam and reddish brown very gravelly very fine sandy loam. The substratum is loose reddish brown sand and gravel to a depth of 60 inches or more.

Included with this soil in mapping are small areas of soils that are similar to this Tunkhannock soil but are sandier and excessively drained. Also included are some small areas of Cheshire soils along valley sides. Also included are some small areas of soils that have scattered stones and boulders. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Tunkhannock soil is at a depth of more than 6 feet. The available water capacity is moderate. Surface runoff is medium. Permeability is moderate or moderately rapid in the surface layer and the subsoil and rapid or moderately rapid in the substratum. Depth to bedrock is more than 60 inches. Gravel or cobbles are common in the surface layer and increase in volume in the subsoil. If the soil has not been limed, the surface layer and the subsoil are extremely acid to moderately acid.

Small areas of this soil are used for forage crops and pasture. Most areas are idle or woodland.

This soil is poorly suited to cultivation because of slope. Erosion is a hazard if the vegetative cover is disturbed. Coarse fragments interfere with some tillage operations and cause greater than normal wear of equipment. Droughtiness is a problem during periods of dry weather in midsummer. Extensive conservation

measures to control both erosion and runoff are needed if the soil is cultivated. Green manure crops, sod crops in rotation, cover crops, and crop residue returned to the soil help to improve the organic matter content, to control erosion, and to increase the available water capacity.

This soil is suited to pasture and hay, but slope limits the use of equipment. In some years new seedings are difficult to establish because of droughtiness. Stocking rates within carrying capacity and restricted grazing, especially during dry periods, help to maintain the quality of pasture and to control erosion.

Potential productivity of northern red oak on this soil is moderately high. Slope is a moderate limitation to use of equipment.

Slope and the erosion hazard are severe limitations to use of this soil for building site development.

Seepage, poor filtering, and slope are severe limitations on sites for sanitary facilities. If the soil is used as sites for sanitary facilities, ground water contamination is a hazard.

This soil is in capability class IVe.

ToE—Tunkhannock and Otisville soils, steep. This map unit consists of very deep soils on the lower parts of valley sides and on the sides of terraces in valleys or along streams. The Tunkhannock soils are well drained to somewhat excessively drained, and the Otisville soils are excessively drained. Some areas are Tunkhannock soils, some are Otisville soils, and some consist of both. The total acreage of the map unit is about 45 percent Tunkhannock soils, 40 percent Otisville soils, and 15 percent other soils. Slopes are mostly smooth and range from 25 to 35 percent. Areas of these soils are long and narrow and range from 3 to 20 acres in size.

Typically, the surface layer of the Tunkhannock soils is dark reddish gray gravelly loam about 6 inches thick. The subsoil, to a depth of 38 inches, is brown very gravelly sandy loam and reddish brown very gravelly very fine sandy loam. The substratum is loose, reddish brown sand and gravel to a depth of 60 inches or more.

Typically, the surface layer of the Otisville soils is dark brown gravelly loamy coarse sand about 9 inches thick. The subsoil is yellowish brown, loose, very gravelly or extremely gravelly loamy coarse sand to a depth of about 33 inches. The substratum is brown sand and gravel to a depth of 60 inches or more.

Included with these soils in mapping are small areas of well drained Cheshire and Valois soils. Also included are small areas of soils that have scattered stones or boulders. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in the Tunkhannock and Otisville soils is at a depth of more than 6 feet. The available water capacity is moderate in the Tunkhannock soils and very low in the Otisville soils. Surface runoff is rapid. Permeability in the Tunkhannock soils is moderately rapid in the surface layer and the subsoil and rapid or moderately rapid in the substratum. Permeability in the Otisville soils is rapid in the surface layer and the subsoil and rapid or very rapid in the substratum. In both soils depth to bedrock is more than 60 inches. Gravel, cobbles, and scattered boulders are on the surface and in the soil. If the soils have not been limed, the surface layer and the subsoil are extremely acid to moderately acid in the Tunkhannock soils and extremely acid to strongly acid in the Otisville soils.

Most areas of the soils in this map unit are idle or forest. These soils are not suited to cultivated crops or hay because of slope, droughtiness, and the erosion hazard. The soils can be used for limited pasture, but in most years summer droughtiness will reduce yields. Stocking rates within carrying capacity prevent overgrazing and help to control erosion.

Potential productivity of northern red oak is moderately high on the Tunkhannock soils and moderate on the Otisville soils. Slope is a moderate limitation to use of equipment. On the Otisville soils, seedling mortality is severe.

Slope and the erosion hazard are severe limitations to use of this soil for building site development. Slope, seepage, and poor filtering are severe limitations on sites for sanitary facilities. If the soils are used as sites for sanitary facilities, ground water contamination is a hazard. Many areas of the soils are good sources of sand and gravel.

These soils are in capability subclass VIe.

ToF—Tunkhannock and Otisville soils, very steep. This map unit consists of very deep soils on the lower parts of valley sides or on the sides of terraces in valleys or along streams. The Tunkhannock soils are well drained to somewhat excessively drained, and the Otisville soils are excessively drained. Some areas are the Tunkhannock soils, some are the Otisville soils, and some consist of both. The total acreage of the map unit is about 45 percent Tunkhannock soils, 40 percent Otisville soils, and 15 percent other soils. Slopes are mostly smooth and range from 35 to 50 percent. Areas of these soils are long and narrow and range from 3 to 20 acres in size.

Typically, the surface layer of the Tunkhannock soils is dark reddish gray gravelly loam about 6 inches thick. The subsoil, to a depth of 38 inches, is brown very

gravelly sandy loam and reddish brown very gravelly very fine sandy loam. The substratum is loose, reddish brown sand and gravel to a depth of 60 inches or more.

Typically, the surface layer of the Otisville soils is dark brown gravelly loamy coarse sand about 9 inches thick. The subsoil is yellowish brown, loose, very gravelly or extremely gravelly loamy coarse sand to a depth of about 33 inches. The substratum is brown sand and gravel to a depth of 60 inches or more.

Included with these soils in mapping are small areas of well drained Cheshire and Valois soils. Also included are small areas of soils that have scattered stones or boulders. The included soils range to 3 acres in size and make up as much as 15 percent of the map unit.

The seasonal high water table in the Tunkhannock and Otisville soils is at a depth of more than 6 feet. The available water capacity is moderate in the Tunkhannock soils and very low in the Otisville soils. Surface runoff is rapid or very rapid. Permeability in the Tunkhannock soils is moderately rapid in the surface layer and the subsoil and rapid or moderately rapid in the substratum. Permeability in the Otisville soils is rapid in the surface layer and the subsoil and rapid or very rapid in the substratum. In both soils depth to bedrock is more than 60 inches. Gravel, cobbles, and scattered boulders are on the surface and in the soils. If the soils have not been limed, the surface layer and the subsoil are extremely acid to moderately acid in the Tunkhannock soils and extremely acid to strongly acid in the Otisville soils.

Most areas of the soils in this map unit are idle or forest. The soils are not suited to general farming because of slope, droughtiness, and the severe erosion hazard.

Potential productivity of northern red oak is moderately high on the Tunkannock soils and moderate on the Otisville soils. Slope is a limitation to use of equipment. Erosion is a moderate hazard. On Otisville soils, seedling mortality is severe.

Slope and the severe erosion hazard are severe limitations of these soils for building site development. Slope, poor filtering, and seepage are severe limitations on sites for sanitary facilities. If the soils are used for sanitary facilities, ground water contamination is a hazard.

These soils are in capability subclass VIIe.

Ud—Udorthents, smoothed. This map unit consists of disturbed soils and areas of earthy materials. They are commonly near sites for industrial or urban development. They are commonly less than 10 acres in size and irregular in shape. Slope ranges from 0 to 15 percent.

Properties of Udorthents, smoothed, vary greatly over short distances. Some areas consist mainly of medium textured to coarse textured, disturbed soils, and other areas have considerable amounts of rock fragments and garbage or various kinds of solid waste. In some units soil removed from one part was used to fill an adjacent area. Typically, in these adjacent areas the surface layer is 2 to 8 inches thick. It is black to red very gravelly sand to silt loam. The substratum is very dusky red to olive yellow extremely gravelly sand to silt loam.

Udorthents, smoothed, are excessively drained to moderately well drained. Texture, content of rock fragments, soil reaction, permeability, and depth to the seasonal high water table differ greatly from one area to another. Depth to bedrock is generally more than 60 inches.

Udorthents, smoothed, are generally devoid of vegetation, but in some places they have a cover of scattered shrubs or grasses.

These soils are fairly suited or poorly suited to agriculture or woodland use. They are poorly suited to urban or recreation use. Onsite investigation is needed for any intended use.

These soils have not been assigned to a capability subclass.

UnA—Unadilla silt loam, 0 to 2 percent slopes. This is a nearly level, very deep, well drained soil on terrace-like positions in valleys and on outwash plains. Areas of the soil are oblong or rounded and range from about 5 to 15 acres in size.

Typically, the surface layer is dark brown silt loam about 5 inches thick. The subsoil is about 24 inches thick. It is brown silt loam in the upper part, dark yellowish brown silt loam in the middle part, and yellowish brown silt loam in the lower part. The substratum is brown and yellowish brown very fine sandy loam to a depth of 60 inches.

Included with this soil in mapping are small areas of moderately well drained Scio soils and pockets of somewhat poorly drained or poorly drained Raynham soils. Also included are some small areas of gravelly and sandy soils. Also included, along streams, are strips of Pope, Barbour, and Suncook soils which are subject to flooding. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

Permeability of the Unadilla soil is moderate in the surface layer and the subsoil. The water table is at a

depth of more than 6 feet. The available water capacity is high. Surface runoff is slow. Depth to bedrock is more than 60 inches. If the soil has not been limed, it ranges from very strongly acid to moderately acid in the surface layer and the subsoil.

Some areas of this Unadilla soil are used for cultivated crops, hay, or pasture. Other areas are forest or idle.

This soil is well suited to cultivated crops, including vegetable crops. It is among the soils in the county that are best suited to food and fiber production. The soil is easy to till and can be used for intensive cropping if it is well managed. It is important to work this soil at proper moisture levels to prevent surface compaction. Such practices as conservation tillage, cover crops, and crop residue incorporated into the soil help to increase the organic matter content and to improve soil tilth.

This soil is well suited to pasture and hay. Restricted grazing or reduced machinery operation on this soil during wet periods helps to prevent surface compaction and destruction of the sod cover.

Potential productivity of sugar maple on this soil is moderate. There are no limitations to woodland use and management.

The limitations are slight to use of this soil as sites for dwellings, small commercial buildings, and septic tank absorption fields. Seepage is a severe limitation on sites for other sanitary facilities. Potential frost action is a severe limitation for local roads and streets.

This soil is in capability class I.

UnB—Unadilla silt loam, 2 to 6 percent slopes. This is a gently sloping, very deep, well drained soil on terrace-like positions in valleys and on rolling plains. Areas of the soil are oblong or rounded and range from about 5 to 15 acres in size.

Typically, the surface layer is dark brown silt loam about 5 inches thick. The subsoil is about 24 inches thick. It is brown silt loam in the upper part, dark yellowish brown silt loam in the middle part, and yellowish brown silt loam in the lower part. The substratum is brown and yellowish brown very fine sandy loam to a depth of 60 inches.

Included with this soil in mapping are a few areas of soils where slopes are more than 6 percent. Also included are small areas of moderately well drained Scio soils and pockets of somewhat poorly drained or poorly drained Raynham soils. Also included are some small areas of gravelly or sandy soils. Also included, along streams, are strips of Pope, Barbour, and Suncook soils, which are subject to flooding. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

Permeability of the Unadilla soil is moderate in the surface layer and the subsoil. The water table is at a depth of more than 6 feet. The available water capacity is high. Surface runoff is slow or medium. Depth to bedrock is more than 60 inches. If the soil has not been limed, it ranges from very strongly acid to moderately acid in the surface layer and the subsoil.

Some areas of this Unadilla soil are used for cultivated crops, hay, or pasture. Other areas are forest or idle.

This soil is well suited to cultivated crops, including vegetable crops. It is among the soils in the county that are best suited to food and fiber production. The soil is easy to till and can be used for intensive cropping if it is well managed. It is important to work this soil at proper moisture levels to prevent surface compaction. The soil is easily eroded. Such practices as contour farming, conservation tillage, cover crops, and crop residue incorporated into the soil help to control erosion. These practices also help to increase the organic matter content and to improve soil tilth.

This soil is suited to pasture and hay. Restricted grazing or reduced machinery operation on this soil during wet periods help to prevent surface compaction and destruction of the sod cover. Erosion is a hazard if the sod cover is allowed to deteriorate.

Potential productivity of sugar maple on this soil is moderate. There are no limitations to woodland use and management.

The limitations are slight to use of this soil as sites for dwellings and septic tank absorption fields. Seepage is a severe limitation on sites for other sanitary facilities. Erosion is a hazard if this soil is left unprotected. Potential frost action is a severe limitation for local roads and streets. Slope is a moderate limitation on sites for small commercial buildings.

This soil is in capability subclass IIe.

VaB—Valois gravelly sandy loam, 3 to 8 percent slopes. This is a very deep, gently sloping, well drained soil on till plains, on small upland knolls, and along some valley sides. Slopes are smooth or slightly convex. Areas of the soil are oblong or irregular in shape and range from about 5 to 15 acres in size.

Typically, the surface layer is covered with black, decomposed organic litter about 1 inch thick. The surface layer is brown gravelly sandy loam to a depth of 3 inches. The subsoil extends to a depth of 36 inches. It is dark reddish brown and strong brown gravelly sandy loam in the upper part and yellowish brown gravelly sandy loam in the lower part. The substratum extends

to a depth of 60 inches or more. It is brown gravelly sandy loam that has lenses of loamy sand.

Included with this soil in mapping are small areas of Swartswood and Wurtsboro soils, which have a dense, firm layer in the lower part of the subsoil. Also included are small areas of more gravelly or sandier Chenango and Riverhead soils along valley sides. Also included, in a few upland areas, are small areas of moderately deep Lordstown soils. Also included are some small areas of very stony or bouldery soils. The included soils range to 3 acres in size and make up 15 to 20 percent of the map unit.

The seasonal high water table in this Valois soil is usually at a depth of more than 6 feet. The available water capacity is moderate. Surface runoff is medium. Permeability is moderate in the surface layer and in the upper part of the subsoil and moderate or moderately rapid below. Depth to bedrock is more than 60 inches. Stones or boulders are scattered on the surface. If the soil has not been limed, the surface layer and the subsoil are extremely acid to moderately acid.

Small areas of this soil are used for hay or pasture. Most areas are forest or idle.

This soil is well suited to cultivated crops, but scattered stones or boulders hinder tillage and cause greater than normal wear of machinery. It is among the soils in the county that are best suited to food and fiber production. Erosion is a moderate hazard on long slopes. Practices such as contour tillage and conservation tillage help to control erosion and to maintain soil productivity.

This soil is suited to pasture and hay, but scattered stones hinder the use of moderate machinery. Stocking rates within carrying capacity prevent overgrazing and help to control erosion and to maintain the quality of pasture.

Potential productivity of sugar maple on this soil is moderate. There are no limitations to woodland use and management.

The limitations are slight to use of the soil as sites for dwellings and shallow excavations. Potential frost action is a moderate limitation for local roads and streets. Slow permeability is a moderate limitation on sites for septic tank absorption fields. Seepage is a severe limitation on sites for other sanitary facilities.

This soil is in capability subclass IIe.

VaC—Valois gravelly sandy loam, 8 to 15 percent slopes. This is a very deep, strongly sloping, well drained soil on till plains, on small upland knolls, and along some valley sides. Slopes are smooth or slightly convex. Areas of the soil are oblong or irregular in shape and range from about 5 to 20 acres in size.

Typically, the surface layer is covered with black, decomposed organic litter about 1 inch thick. The surface layer is brown gravelly sandy loam to a depth of 3 inches. The subsoil extends to a depth of 36 inches. It is dark reddish brown and strong brown gravelly sandy loam in the upper part and yellowish brown gravelly sandy loam in the lower part. The substratum extends to a depth of 60 inches or more. It is brown gravelly sandy loam that has lenses of loamy sand.

Included with this soil in mapping are small areas of Swartswood and Wurtsboro soils, which have a dense, firm layer in the lower part of the subsoil. Also included are small areas of more gravelly or sandier Chenango and Riverhead soils along valley sides. Also included, in a few upland areas, are small areas of moderately deep Lordstown soils. Also included are some small areas of very stony or bouldery soils. The included soils range to 3 acres in size and make up 15 to 20 percent of the map unit.

The seasonal high water table in this Valois soil is usually at a depth of more than 6 feet. The available water capacity is moderate. Surface runoff is medium. Permeability is moderate in the surface layer and in the upper part of the subsoil and moderate or moderately rapid below. Depth to bedrock is more than 60 inches. Stones or boulders are scattered on the surface. If the soil has not been limed, the surface layer and the subsoil are extremely acid to moderately acid.

Small areas of this soil are used for hay or pasture. Most areas are forest or idle.

The soil is moderately suited to cultivated crops, but scattered stones or boulders hinder tillage and cause greater than normal wear of machinery. Erosion is a moderate hazard. Structures such as diversions or terraces help to control erosion and to reduce runoff. Other practices, such as contour tillage and conservation tillage, also help to control erosion and to maintain soil productivity.

This soil is suited to pasture and hay, but scattered stones hinder the use of modern machinery. Stocking rates within carrying capacity prevent overgrazing and help to control erosion and to maintain the quality of pasture.

Potential productivity of sugar maple on this soil is moderate. There are no limitations to woodland use and management.

Slope and the erosion hazard are moderate limitations to use of this soil as sites for dwellings, local roads and streets, and shallow excavations. Potential frost action is a limitation for local roads and streets. Slow permeability and slope are moderate limitations on

sites for septic tank absorption fields.

This soil is in capability subclass IIIe.

VaD—Valois gravelly sandy loam, 15 to 25 percent slopes. This s a very deep, moderately steep, well drained soil on hillsides on uplands and along some valley sides. Slopes are smooth or slightly convex. Areas of the soil are oblong in shape and range from about 5 to 25 acres in size.

Typically, the surface layer is covered with black, decomposed organic litter about 1 inch thick. The surface layer is brown gravelly sandy loam to a depth of 3 inches. The subsoil extends to a depth of 36 inches. It is dark reddish brown and strong brown gravelly sandy loam in the upper part and yellowish brown gravelly sandy loam in the lower part. The substratum extends to a depth of 60 inches or more. It is brown gravelly sandy loam that has lenses of loamy sand.

Included with this soil in mapping are small areas of Swartswood and Wurtsboro soils, which have a dense, firm layer in the lower part of the subsoil. Also included are small areas of more gravelly or sandier Chenango and Riverhead soils along valley sides. Also included, in a few upland areas, are small areas of moderately deep Lordstown soils. Also included are some small areas of very stony or bouldery soils. The included soils range to 3 acres in size and make up 15 to 20 percent of the map unit.

The seasonal high water table in this Valois soil is usually at a depth of more than 6 feet. The available water capacity is moderate. Surface runoff is medium or rapid. Permeability is moderate in the surface layer and in the upper part of the subsoil and moderate or moderately rapid below. Depth to bedrock is more than 60 inches. Stones or boulders are scattered on the surface. If the soil has not been limed, the surface layer and the subsoil are extremely acid to moderately acid.

Small areas of this soil are used for hay or pasture. Most areas are forest or idle.

This soil is poorly suited to cultivated crops because of slope and the hazard of erosion. Scattered stones or boulders hinder tillage and cause greater than normal wear of machinery. Extensive conservation measures are needed to control both erosion and runoff if the soil is cultivated. Such structures as diversions or terraces help to control erosion and to reduce runoff. Other practices, such as contour tillage and conservation tillage, a high proportion of sod crops in the rotation, and cover crops help to control erosion and to maintain soil productivity.

This soil is suited to pasture and hay, but slope and scattered stones hinder the operation of modern machinery. Stocking rates within carrying capacity prevent overgrazing and help to control erosion and to maintain the quality of pasture.

Potential productivity of sugar maple on this soil is moderate. Slope is a moderate limitation to use of equipment.

Slope and the erosion hazard are severe limitations to use of this soil for building site development. Slope and seepage in the subsoil are severe limitations on sites for sanitary facilities.

This soil is in capability subclass IVe.

VaE—Valois gravelly sandy loam, 25 to 35 percent slopes. This is a very deep, steep, well drained soil on hillsides on uplands and along some valley sides. Slopes are smooth. Areas of the soil are generally long and narrow and range from about 5 to 25 acres in size.

Typically, the surface layer is covered with black, decomposed organic litter about 1 inch thick. The surface layer is brown gravelly sandy loam to a depth of 3 inches. The subsoil extends to a depth of 36 inches. It is dark reddish brown and strong brown gravelly sandy loam in the upper part and yellowish brown gravelly sandy loam in the lower part. The substratum extends to a depth of 60 inches or more. It is brown gravelly sandy loam that has lenses of loamy sand.

Included with this soil in mapping are small areas of Swartswood soils, which have a dense, firm layer in the lower part of the subsoil. Also included are small areas of more gravelly or sandier Chenango and Riverhead soils along valley sides. Also included, in a few upland areas, are small areas of moderately deep Lordstown soils. Also included are some small areas of very stony or bouldery soils. The included soils range to 3 acres in size and make up 15 to 20 percent of the map unit.

The seasonal high water table in this Valois soil is usually at a depth of more than 6 feet. The available water capacity is moderate. Surface runoff is rapid. Permeability is moderate in the surface layer and in the upper part of the subsoil and moderate or moderately rapid below. Depth to bedrock is more than 60 inches. Stones or boulders are scattered on the surface. If the soil has not been limed, the surface layer and the subsoil are extremely acid to moderately acid.

Most areas of this soil are forest. A few areas are idle. The soil is not suited to cultivated crops because of steep slopes and the hazard of erosion.

This soil can be used for a limited amount of pasture, but scattered stones and steep slopes limit or prevent the use of modern farm machinery. Stocking rates within carrying capacity prevent overgrazing and help to control erosion and to maintain needed sod cover.

Potential productivity of sugar maple on this soil is moderate. Slope is a moderate limitation to use of equipment.

Slope and the erosion hazard are severe limitations to use of this soil for building site development. Slope and seepage are severe limitations on sites for sanitary facilities. Potential of the soil is good as habitat for woodland wildlife.

This soil is in capability subclass VIe.

VaF—Valois gravelly sandy loam, 35 to 50 percent slopes. This is a very deep, very steep, well drained soil on hillsides on uplands and along some valley sides. Slopes are smooth. Areas of the soil are generally long and narrow and range from about 5 to 25 acres in size.

Typically, the surface layer is covered with black, decomposed organic litter about 1 inch thick. The surface layer is brown gravelly sandy loam to a depth of 3 inches. The subsoil extends to a depth of 36 inches. It is dark reddish brown and strong brown gravelly sandy loam in the upper part and yellowish brown gravelly sandy loam in the lower part. The substratum extends to a depth of 60 inches or more. It is brown gravelly sandy loam that has lenses of loamy sand.

Included with this soil in mapping are small areas of Swartswood soils, which have a dense, firm layer in the lower part of the subsoil. Also included are small areas of more gravelly or sandier Chenango and Riverhead soils along valley sides. Also included, in a few upland areas, are small areas of moderately deep Lordstown soils. Also included are some small areas of very stony or bouldery soils. The included soils range to 3 acres in size and make up 15 to 20 percent of the map unit.

The seasonal high water table in this Valois soil is usually at a depth of more than 6 feet. The available water capacity is moderate. Surface runoff is very rapid. Permeability is moderate in the surface layer and in the upper part of the subsoil and moderate or moderately rapid below. Depth to bedrock is more than 60 inches. Stones or boulders are scattered on the surface. If the soil has not been limed, the surface layer and the subsoil are extremely acid to moderately acid.

Most areas of this soil are forest. The soil is not suited to cultivated crops, hayland, or pasture because of very steep slopes and the severe erosion hazard.

Potential productivity of sugar maple on this soil is moderate. Slope is a severe limitation to use of equipment. Erosion is a moderate hazard.

Slope is a severe limitation to use of this soil for building site development and as sites for sanitary facilities. Seepage is a limitation on sites for sanitary facilities. Erosion is a hazard on construction sites. The soil can be used as habitat for woodland wildlife.

This soil is in capability subclass VIIe.

Wa—Wallington silt loam. This is a very deep, nearly level, somewhat poorly drained soil on old lake plains, silt-filled upland basins, and on stream terraces. Slopes are smooth and range from 0 to 3 percent. Areas of the soil are irregular in shape and range from about 5 to 30 acres in size.

Typically, the surface layer is covered with a layer of black, partly decomposed leaves and twigs. The surface layer is about 6 inches thick. In the uppermost 1 inch it is pale brown silt loam. Below that, it is pinkish gray very fine sandy loam. The subsoil is about 27 inches thick. It is dark grayish brown very fine sandy loam in the upper part, grayish brown and brown silt loam in the middle part, and brown, mottled silt loam in the lower part, which is very firm and brittle. The substratum is brown, mottled silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of similar Raynham soils and better drained Scio soils that do not have a dense, firm layer in the subsoil. Also included are small areas of Philo and Basher soils that are subject to flooding and that do not have a dense, firm layer in the subsoil. Also included are some areas of stony or gravelly soils. The included soils range to 2 acres in size, and make up about 15 percent of the map unit.

The seasonal high water table in this Wallington soil is perched, at a depth of 0.5 foot to 1.5 feet, above the dense, firm part of the subsoil. The available water capacity is moderate. Surface runoff is slow. Permeability is moderate above the fragipan and slow in the fragipan and the substratum. Depth to bedrock is more than 60 inches. If the soil has not been limed, the surface layer and the subsoil are very strongly acid to slightly acid.

Most areas of this soil are forest or idle. The soil is moderately well suited to some cultivated crops, but the seasonal high water table is a severe limitation to many farming operations and restricts the choice of crops that can be grown. Where adequately drained, it is among the soils in the county that are best suited to food and fiber production. Artificial drainage, including subsurface drains and open drains, and diversions to intercept water from higher areas are needed if the soil is used for cultivated crops. In most areas suitable drainage outlets are difficult to establish.

This soil is suited to pasture and hay crops. Selecting water-tolerant plant species is a suitable management

practice. Restricted grazing during wet periods helps to maintain the quality of pasture.

Potential productivity of northern red oak on this soil is moderate. The equipment limitation, seedling mortality, and windthrow hazard all are moderate because of the seasonal high water table.

The seasonal high water table is a severe limitation to use of this soil for building site development and as sites for sanitary facilities. Slow permeability is a limitation on sites for septic tank absorption fields. Sometimes the water table is near the surface during wet periods. Potential frost action is high.

This soil is in capability subclass IIIw.

Wd—Wayland silt loam. This is a nearly level, very deep, very poorly drained or poorly drained soil that formed in recent alluvium of silt and very fine sand. It is in flat or slightly depressed areas along streams and rivers and is subject to frequent flooding. Areas of the soil are long, narrow, and irregular in shape and range from about 5 to 20 acres or more in size. Slope ranges from 0 to 3 percent.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. The subsoil is mottled, grayish brown silt loam about 13 inches thick. The substratum is mottled, gray and pale olive silt loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of better drained Philo and Bash soils. Also included are areas of Fluvaquents and Udifluvents along major streams and waterways. All these soils are subject to flooding. Also included are some areas of organic soils that have a silty, alluvial surface layer. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

The seasonal high water table in this Wayland soil is within a depth of 0.5 foot in fall, winter, and spring. Permeability is moderate in the surface layer and slow in the subsoil and the substratum. The available water capacity is high. Surface runoff is slow. If the soil has not been limed, the surface layer ranges from strongly acid to slightly acid and the subsoil ranges from strongly acid to neutral.

Most areas of this soil are idle or forest.

This soil is poorly suited to the common crops grown in the region. The seasonal high water table and frequent flooding are the main limitations for cultivated crops and permanent pasture. Most areas can be developed for use as habitat for wetland wildlife.

Potential productivity of red maple on this soil is moderate. The equipment limitation, seedling mortality, and windthrow hazard are all severe because of the seasonal high water table and flooding.

The seasonal high water table and flooding are severe limitations to use of this soil for building site development and as sites for sanitary facilities. Low strength is a limitation for local roads and streets. Slow permeability is a limitation on sites for septic tank absorption fields.

This soil is in capability subclass Vw.

WeA—Wellsboro gravelly loam, 0 to 3 percent slopes. This is a very deep, nearly level, moderately well drained soil on till plains. Slopes are smooth. Areas of the soil are oval or irregular in shape. They range from about 3 to 20 acres, but areas of 5 to 10 acres are most common.

Typically, the surface layer is dark reddish brown gravelly loam about 7 inches thick. The subsoil extends to a depth of about 23 inches. In the upper part it is reddish brown loam and gravelly loam. In the lower part it is very firm and brittle reddish brown gravelly loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Lackawanna and Morris soils. Wellsboro soils are wetter than Lackawanna soils but are better drained than Morris soils. Also included, in the central and northern parts of the survey area, are small areas of sandier or browner Swartswood, Wurtsboro, and Scriba soils. Also included are small areas of stony or bouldery soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

Permeability of this Wellsboro soil is moderate above the fragipan and slow in the fragipan. The seasonal high water table is perched above the fragipan in late fall and early spring. Surface runoff is slow. The available water capacity is moderate. Depth to bedrock is generally more than 60 inches. If the soil has not been limed, it is very strongly acid to moderately acid.

Most areas of this soil are used for farming. Other areas are used for recreation or as building sites, and some areas are idle or forest.

This soil is well suited to cultivated crops. In some areas the seasonal high water table and included wet soils hinder cultivation. Drainage or diversions to intercept water from surrounding higher areas will improve crop response. Water-tolerant plant varieties will improve the productivity of the soil.

This soil is well suited to pasture and hay. Water-tolerant plant varieties will be most productive. Restricted grazing during wet periods helps to maintain a permanent sod cover.

Potential productivity of northern red oak on this soil

is moderately high. There are no limitations to woodland use and management.

The seasonal high water table is a moderate limitation to use of this soil for dwellings without basements and small commercial buildings. Potential frost action is a severe limitation for local roads and streets. The seasonal high water table and slow permeability are severe limitations on sites for septic tank absorption fields.

This soil is in capability subclass IIw.

WeB—Wellsboro gravelly loam, 3 to 8 percent slopes. This is a very deep, gently sloping, moderately well drained soil on hillsides and hilltops. Slopes are smooth or slightly concave. Areas of the soil are oval or irregular in shape. They range from about 3 to 60 acres, but areas of 5 to 20 acres are most common.

Typically, the surface layer is dark reddish brown gravelly loam about 7 inches thick. The subsoil extends to a depth of about 23 inches. In the upper part it is reddish brown loam and gravelly loam. In the lower part it is very firm and brittle reddish brown gravelly loam to a depth of 60 inches or more.

Included with this soil n mapping are small areas of Lackawanna and Morris soils. Wellsboro soils are wetter than Lackawanna soils but are better drained than Morris soils. Also included, in the central and northern parts of the survey area, are small areas of sandier or browner Swartswood, Wurtsboro, and Scriba soils. Also included are small areas of bouldery or stony soils. The included soils range to 3 acres in size and make up about 25 percent of the map unit.

Permeability of this Wellsboro soil is moderate above the fragipan and slow in the fragipan. The seasonal high table is perched above the fragipan in late fall and early spring. Surface runoff is medium. The available water capacity is moderate. Depth to bedrock is generally more than 60 inches. If the soil has not been limed, it is very strongly acid to moderately acid.

Most areas of this soil are used for farming, for recreation, or as building sites (fig. 13). Some areas are idle or forest.

This soil is well suited to cultivated crops. In some areas the seasonal high water table and included wet soils hinder cultivation. Drainage or diversions to intercept water from surrounding higher areas will improve crop response. Water-tolerant plant varieties will improve productivity of the soil. On some long slopes erosion is a hazard.

This soil is well suited to pasture and hay. Water-tolerant plant varieties will be most productive. Restricted grazing during wet periods helps to maintain a permanent sod cover.

Potential productivity of northern red oak on this soil is moderately high. There are no limitations to woodland use and management.

The seasonal high water table is a moderate limitation to use of this soil as sites for dwellings without basements and small commercial buildings. Potential frost action is a severe limitation for local roads and streets. The seasonal high water table and slow permeability are severe limitations on sites for septic tank absorption fields.

This soil is in capability subclass IIw.

WeC—Wellsboro gravelly loam, 8 to 15 percent slopes. This is a very deep, sloping, moderately well drained soil on hillsides. Slopes are smooth or concave. Areas of the soil are oval or irregular in shape. They range from about 3 to 50 acres, but areas of 5 to 20 acres are most common.

Typically, the surface layer is dark reddish brown gravelly loam about 7 inches thick. The subsoil extends to a depth of about 23 inches. In the upper part it is reddish brown loam and gravelly loam. In the lower part it is very firm and brittle reddish brown gravelly loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Lackawanna and Morris soils. Wellsboro soils are wetter than Lackawanna soils but are better drained than Morris soils. Also included, in the central and northern parts of the survey area, are small areas of sandier or browner Swartswood, Wurtsboro, and Scriba soils. Also included, on hillsides or hilltops, are small areas of moderately deep, better drained Oquaga soils. Also included are some small areas of stony or bouldery soils. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

Permeability of the Wellsboro soil is moderate above the fragipan and slow in the fragipan. The seasonal high water table is perched above the fragipan in late fall and early spring. Surface runoff is medium or rapid. The available water capacity is moderate. Depth to bedrock is generally more than 60 inches. If the soil has not been limed, it is very strongly acid to moderately acid.

Most areas of this soil are used for most crops grown in the county, for recreation, or as building sites. Some areas are idle or forest.

This soil is moderately suited to farming. Slope and the seasonal high water table hinder farming operations. Drainage is needed for some wet spots.

Figure 13.—Wellsboro gravelly loam, 3 to 8 percent slopes, is commonly used for cultivated crops or forage crops. Scattered areas are used for community development. In the wooded area in the foreground is mainly very poorly drained Carlisle muck and Palms muck.

Diversions or terraces help to reduce runoff and to control erosion. Conservation tillage and cover crops help to maintain productivity of the soil and to control erosion.

This soil is suited to pasture and hay. Water-tolerant forage plants will be more productive. Stocking rates within carrying capacity and restricted grazing during wet periods help to maintain a permanent sod cover and to control erosion.

Potential productivity of northern red oak on this soil is moderately high. There are no limitations to woodland use and management.

Slope and the seasonal high water table are moderate limitations to use of this soil as sites for dwellings without basements. The seasonal high water table is a severe limitation on sites for dwellings with basements. The seasonal high water table and potential frost action are severe limitations on sites for local roads and streets. The seasonal high water table and slow permeability are severe limitations on sites for

septic tank absorption fields. During construction minimum site disturbance and temporary cover crops help to control erosion.

This soil is in capability subclass IIIe.

WlC—Wellsboro and Wurtsboro soils, strongly sloping, extremely stony. This map unit consists of very deep, moderately well drained soils that formed in glacial till on upland till plains and the lower parts of hillsides on uplands. Some areas are the Wellsboro soils, some are the Wurtsboro soils, some consist of both. The total acreage of the map unit is about 40 percent Wellsboro soils, 40 percent Wurtsboro soils, and 20 percent other soils. Texture of the surface, excluding stones, are gravelly silt loam or gravelly loam. Stones more than 10 inches in diameter and about 2.5 to 5 feet apart cover 3 to 15 percent of the surface. These soils have a dense, firm fragipan. Areas of these soils are irregular in shape. They range from 5 to 100 acres or more in size, but areas of 15 to 50 acres are most common. Slopes range from 0 to 15 percent.

Typically, the surface layer of the Wellsboro soils is dark reddish brown gravelly loam about 7 inches thick. The subsoil extends to a depth of 60 inches or more. In the upper part it is reddish brown loam and gravelly loam to a depth of 23 inches. In the lower part it is very firm and brittle, reddish brown gravelly loam.

Typically, the surface layer of the Wurtsboro soils is covered with black organic litter about 2 inches thick. The surface layer is brown loam about 2 inches thick. The subsoil, to a depth of about 26 inches, consists of layers of yellowish brown and brown loam. Below that, to a depth of 60 inches or more, it is a firm and brittle layer, or fragipan, of mottled, reddish brown gravelly fine sandy loam.

Included with these soils in mapping are small areas of better drained Swartswood and Lackawanna soils and small areas of wetter Scriba and Morris soils. Also included are small areas of moderately deep Lordstown and Oquaga soils. Also included are common areas of soils that are similar to these Wellsboro and Wurtsboro soils but have fewer stones and boulders on the surface. The included soils range to 3 acres in size and make up as much as 20 percent of the map unit.

Permeability of the Wellsboro and Wurtsboro soils is moderate above the fragipan and slow in the fragipan. The seasonal high water table in both soils is perched above the fragipan from late fall to early spring. The available water capacity for both soils is moderate. Surface runoff is medium or rapid. Depth to bedrock is more than 60 inches. If the soils have not been limed, the surface layer and the upper part of the subsoil range from extremely acid to strongly acid in the Wurtsboro soils and from very strongly acid to moderately acid in the Wellsboro soils.

In most areas these soils are wooded. They are not suited to cultivated crops. Cultivation and other farming operations with machinery are impracticable on these soils because of large stones (fig. 14). Some areas can be used for limited or unimproved pasture.

Potential productivity of northern red oak on these soils is moderately high. Stones are a moderate limitation to use of equipment.

The seasonal high water table is a moderate limitation to use of these soils as sites for dwellings without basements. The seasonal high water table and potential frost action are severe limitations on sites for local roads and streets. The seasonal high water table is a severe limitation on sites for dwellings with basements. The seasonal high water table and slow permeability are severe limitations on sites for septic tank absorption fields.

Potential of these soils is fair to good as habitat for wildlife.

These soils are in capability subclass VIIs.

WmA—Willowemoc silt loam, 0 to 3 percent slopes. This is a very deep, nearly level, moderately well drained soil on till plains in the area of the Catskill Mountains. Slopes are smooth. Areas of the soil are oval or irregular in shape and range from about 5 to 10 acres in size.

Typically, the surface layer is dark reddish brown silt loam about 4 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red loam in the upper part, reddish brown gravelly fine sandy loam in the middle part, and reddish brown gravelly loam in the lower part. Below a depth of 24 inches it is very firm and brittle.

Included with this soil in mapping are small areas of somewhat poorly drained Onteora soils within slightly depressed areas. Also included are a few areas of stony or bouldery soils. The included soils are as much as 2 acres in size and make up about 20 percent of the map unit.

The seasonal high water table in this Willowemoc soil is perched above the very firm and brittle part of the subsoil at a depth of about 1.5 feet. The available water capacity is moderate. Surface runoff is slow. Permeability is moderate in the surface layer and in the upper part of the subsoil and slow or very slow in the lower part of the subsoil (fragipan). Depth to bedrock is generally more than 60 inches. If the soil has not been limed, it ranges from extremely acid to strongly acid.

Figure 14.—A typical area of Wellsboro and Wurtsboro soils, strongly sloping, extremely stony. Because of the numerous stones on the surface in most areas, these soils are used mainly for timber production and are partly in recreation use.

Most areas of this soil are forest or idle.

This soil is well suited to cultivated crops. But, in most years the growing season is several weeks shorter than in those parts of the county at lower elevations. The seasonal high water table in spring and in other periods during the growing season limits the choice of crops. Planting varieties that tolerate a short growing season and the seasonal high water table is a suitable management practice. Practices such as diversions that intercept runoff from higher areas will improve productivity on this soil.

This soil is suited to use as pasture and hayland. The most productive plant varieties on the soil are those that tolerate the seasonal high water table. Restricted grazing during wet periods helps to maintain a permanent sod cover.

Potential productivity of sugar maple on this soil is moderate. There are no limitations to woodland use and management.

The seasonal high water table is a limitation to use of this soil for dwellings without basements and small commercial buildings. The seasonal high water table and potential frost action are limitations for local roads and streets. The seasonal high water table and slow permeability are limitations on sites for septic tank absorption fields.

This soil is in capability subclass IIw.

WmB—Willowemoc silt loam, 3 to 8 percent slopes. This is a very deep, gently sloping, moderately well drained soil on till plains and the lower parts of mountainsides in the Catskill Mountains. Slopes are smooth or slightly concave. Areas of the soil are irregular in shape and range from about 5 to 40 acres in size.

Typically, the surface layer is dark reddish brown silt loam about 4 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red loam in the upper part, reddish brown gravelly fine sandy loam in the middle part, and reddish brown gravelly loam in the lower part. Below a depth of 24 inches it is very firm and brittle.

Included with this soil in mapping are small areas of well drained Lewbeach and Elka soils on the higher parts of the landscape and somewhat poorly drained Onteora soils in lower, flatter areas. Also included are a few areas of stony or bouldery soils. The included soils range to 3 acres in size and make up about 20 percent of the map unit.

The seasonal high water table in this Willowemoc soil is perched above the very firm and brittle part of the subsoil at a depth of 1.5 feet. The available water capacity is moderate. Surface runoff is medium. Permeability is moderate in the surface layer and the upper part of the subsoil and slow or very slow in the lower part of the subsoil (fragipan). Depth to bedrock is generally more than 60 inches. If the soil has not been limed, it ranges from extremely acid to strongly acid.

Most areas of this soil are forest or idle.

This soil is well suited to cultivated crops. But, in most years, the growing season is several weeks shorter than in other parts of the county. The seasonal high water table in spring and in other periods during the growing season limits the choice of crops. Planting varieties that tolerate the short growing season and the seasonal high water table is a suitable management practice. Drainage practices, such as diversions, to intercept runoff from higher areas will improve productivity of the soil.

This soil is suited to pasture and hay. The most productive plant varieties on the soil are those that tolerate the seasonal high water table. Restricted grazing during wet periods helps to maintain a permanent sod cover.

Potential productivity of sugar maple on this soil is moderate. There are no limitations to woodland use and management.

The seasonal high water table is a moderate limitation to use of this soil as sites for dwellings without basements and small commercial buildings. Potential frost action is a severe limitation for local roads and streets. The seasonal high water table and slow permeability are severe limitations on sites for septic tank absorption fields.

This soil is in capability subclass IIw.

WmC—Willowemoc silt loam, 8 to 15 percent slopes. This is a very deep, strongly sloping, moderately well drained soil on the lower parts of mountainsides in the Catskill Mountains. Slopes are smooth or slightly concave. Areas of the soil are irregular in shape and range from about 5 to 30 acres in size.

Typically, the surface layer is dark reddish brown silt loam about 4 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red loam in the upper part, reddish brown gravelly fine sandy loam in the middle part, and reddish brown gravelly loam in the lower part. Below a depth of 24 inches it is very firm and brittle.

Included with this soil in mapping are small areas of well drained Lewbeach and Elka soils on the higher parts of the landscape and somewhat poorly drained Onteora soils in lower, flatter areas. Also included are a few areas of stony or bouldery soils. The included soils range to 3 acres in size and make up about 20 percent of the map unit.

The seasonal high water table in this Willowemoc soil is perched, at a depth of 1.5 feet, above the dense, very firm and brittle part of the subsoil. The available water capacity is moderate. Surface runoff is medium. Permeability is moderate in the surface layer and the upper part of the subsoil and slow or very slow in the lower part of the subsoil (fragipan). Depth to bedrock is generally more than 60 inches. If the soil has not been limed, it ranges from extremely acid to strongly acid.

Most areas of this soil are forest or idle.

This soil is moderately suited to cultivated crops. But, in most years, the growing season is several weeks shorter than in other parts of the county. The seasonal high water table in spring and other wet periods limits the choice of crops. Slope hinders farming operations. Planting varieties that tolerate the short growing season and the seasonal high water table is a suitable management practice. Drainage practices, such as diversions or grassed waterways, to intercept runoff from adjacent higher areas help to control erosion. Conservation tillage, contour tillage, and cover crops help to control erosion and to maintain productivity of the soil.

This soil is suited to pasture and hay. The most productive plant varieties are those that tolerate the

seasonal high water table. Stocking rates within carrying capacity and restricted grazing during wet periods help to maintain a permanent sod cover and to control erosion.

Potential productivity of sugar maple on this soil is moderate. There are no limitations to woodland use and management.

The seasonal high water table and slope are moderate limitations to use of this soil as sites for dwellings without basements. Potential frost action is a severe limitation for local roads and streets. The seasonal high water table and slow permeability are severe limitations on sites for septic tank absorption fields.

This soil is in capability subclass IIIe.

WoC—Willowemoc silt loam, strongly sloping, very stony. This is a very deep, nearly level to strongly sloping, moderately well drained soil on till plains and the lower parts of mountainsides in the Catskill Mountains. Slopes are mostly smooth or slightly concave and range from about 1 to 15 percent. Stones and boulders more than 10 inches in diameter and about 5 to 30 feet apart are on the surface. Areas of the soil are irregular in shape. They range from about 3 to 50 acres or more.

Typically, the surface layer is dark reddish brown silt loam about 4 inches thick. The subsoil extends to a depth of 60 inches or more. It is yellowish red loam in the upper part, reddish brown gravelly fine sandy loam in the middle part, and reddish brown gravelly loam in the lower part. Below a depth of 24 inches it is very firm and brittle.

Included with this soil in mapping are small areas of well drained Lewbeach and E ka soils and well drained, moderately deep Mongaup soils on higher parts of the landscape. Also included, in flatter or lower areas, are small areas of somewhat poorly drained Onteora soils. Also ncluded are small areas of soils that do not have stones or boulders. The included soils range to as much as 5 acres in size and make up about 20 percent of the map unit.

The seasonal high water table in this Willowemoc soil is perched, at a depth of 1.5 feet, above the very firm and brittle subsoil. The available water capacity is moderate. Surface runoff is medium. Permeability is moderate in the surface layer and the upper part of the subsoil and slow or very slow in the lower part of the subsoil (fragipan). Depth to bedrock is generally more than 60 inches. If the soil has not been limed, it ranges from extremely acid to strongly acid.

Most areas of this soil are forest or idle. The soil is not suited to cultivated crops unless it has been cleared of stones. In most years the growing season is several weeks shorter than in parts of the county at lower elevations. The seasonal high water table in spring and in other wet periods also limits use of the soil. Removal of stones and such practices as diversions or artificial drainage are commonly needed if the soil is used for hay or pasture.

If the soil is used for pasture, planting species that tolerate the seasonal high water table is a suitable management practice. Restricted grazing during wet periods helps to maintain a better sod cover. Stones interfere with pasture improvement practices.

Potential productivity of sugar maple on this soil is moderate. There are few or no limitations to woodland use and management, but stones interfere with replanting.

The seasonal high water table and slope are moderate limitations to use of this soil as sites for dwellings without basements. Potential frost action is a severe limitation for local roads and streets. The seasonal high water table and slow permeability are severe limitations on sites for septic tank absorption fields. Stones also limit building site development.

This soil is in capability subclass VIs.

WuA—Wurtsboro loam, 0 to 3 percent slopes, stony. This is a very deep, nearly level, moderately well drained soil on upland till plains. Slopes are smooth. Areas of the soil are oval, irregular, or elongated in shape. They range from about 3 to 20 acres in size, but areas of 5 to 10 acres are most common. Stones more than 10 inches in diameter and about 25 to 75 feet apart cover 0.01 to 0.1 percent of the surface.

Typically, the surface layer is covered with black, partly decomposed leaf litter about 2 inches thick. The surface layer is brown loam about 2 inches thick. The subsoil, to a depth of about 26 inches, consists of layers of brown and yellowish brown loam. Below that, it is firm and brittle, reddish brown gravelly fine sandy loam to a depth of 60 inches or more. It is mottled below a depth of 16 inches.

Included with this soil in mapping are small areas of Scriba and Swartswood soils. Wurtsboro soils are wetter than Swartswood soils but are better drained than Scriba soils. Also included, in the central part of the survey area, are better drained Lackawanna soils and wetter Morris soils. Also included are small areas of soils that have a nonstony or very stony surface. The included soils range to 3 acres in size and make up as much as 15 percent of the map unit.

Permeability of this Wurtsboro soil is moderate to a

depth of about 26 inches and slow below that depth. The seasonal high water table is perched above the firm and brittle part of the subsoil (fragipan) in late fall and early spring. Surface runoff is slow. The available water capacity is moderate. Depth to bedrock is generally more than 60 inches. If the soil has not been limed, it is strongly acid to extremely acid throughout.

Areas of this soil are used for farming, woodland, or recreation or as building sites, or are idle.

This soil is well suited to farming. But, in some areas the seasonal high water table or included wet spots and stones hinder cultivation. Drainage or diversions to intercept runoff from surrounding higher areas will improve crop response. Planting varieties that tolerate the seasonal high water table will improve productivity of the soil.

If this soil is suited to use as pasture and hayland, the most productive plant varieties are those that tolerate the seasonal high water table. Restricted grazing during wet periods helps to maintain a permanent sod cover.

Potential productivity of northern red oak on this soil is moderately high. There are no limitations to woodland use and management.

The seasonal high water table is a moderate limitation to use of this soil as sites for dwellings without basements. The seasonal high water table and potential frost action are moderate limitations for local roads and streets. The seasonal high water table and potential frost action are severe limitations on sites for septic tank absorption fields.

This soil is in capability subclass IIw.

WuB—Wurtsboro loam, 3 to 8 percent slopes, stony. This is a very deep, gently sloping, moderately well drained soil on hillsides and hilltops. Slopes are smooth or concave. Areas of the soil are oval, irregular, or elongated in shape. They range from about 3 to 45 acres in size, but areas of 5 to 20 acres are most common. Stones more than 10 inches in diameter and about 25 to 75 apart cover 0.01 to 0.1 percent of the surface.

Typically, the surface layer is covered with black, partly decomposed leaf litter about 2 inches thick. The surface layer is brown loam about 2 inches thick. The subsoil, to a depth of about 26 inches, consists of layers of brown and yellowish brown loam. Below that, it is firm and brittle, reddish brown gravelly fine sandy loam to a depth of 60 inches or more. It is mottled below a depth of 16 inches.

Included with this soil in mapping are small areas of Scriba and Swartswood soils. The Wurtsboro soil is wetter than Swartswood soils but is better drained than Scriba soils. Also included, in the central and northwest parts of the survey area, are better drained Lackawanna and Valois soils and wetter Morris soils. Also included are small areas of soils that have a nonstony or very stony surface. The included soils range to 3 acres in size and make up about 15 percent of the map unit.

Permeability of this Wurtsboro soil is moderate to a depth of 26 inches and slow below that depth. The seasonal high water table is perched above the firm and brittle part of the subsoil (fragipan) in late fall and early spring. Surface runoff is medium. The available water capacity is moderate. Depth to bedrock is generally more than 60 inches. If the soil has not been limed, it is strongly acid to extremely acid.

Areas of this soil are used for farming, woodland, or recreation, or as buildings sites, or are idle.

This soil is well suited to farming. But, in some areas the seasonal high water table or included wet spots and stones hinder cultivation. Erosion is also a hazard. Drainage or diversions to intercept runoff from surrounding higher areas will improve crop response. Planting varieties that tolerate the seasonal high water table will improve productivity of the soil.

This soil is well suited to use as pasture and hayland. The most productive plant varieties are those that tolerate the seasonal high water table. Restricted grazing during wet periods helps to maintain a permanent sod cover.

Potential productivity of northern red oak on this soil is moderately high. There are no limitations to woodland use and management.

The seasonal high water table is a moderate limitation to use of this soil as sites for dwellings without basements. The seasonal high water table and potential frost action are moderate limitations for local roads and streets. The seasonal high water table and slow permeability are severe limitations on sites for septic tank absorption fields.

This soil is in capability subclass IIw.

WuC—Wurtsboro loam, 8 to 15 percent slopes, stony. This is a very deep, strongly sloping, moderately well drained soil on hillsides. Slopes are smooth or concave. Areas of the soil are oval or irregular in shape. They range from about 3 to 40 acres in size, but areas of 5 to 20 acres are most common. Stones more than 10 inches in diameter and about 25 to 75 feet apart cover 0.01 to 0.1 percent of the surface.

Typically, the surface layer is covered with black, partly decomposed leaf litter about 2 inches thick. The surface layer is brown loam about 2 inches thick. The

subsoil, to a depth of about 26 inches, consists of layers of brown and yellowish brown loam. Below that, it is firm and brittle, reddish brown gravelly fine sandy loam to a depth of 60 inches or more. It is mottled below a depth of 16 inches.

Included with this soil in mapping are small areas of Scriba and Swartswood soils. The Wurtsboro soil is wetter than Swartswood soils but is better drained than Scriba soils. Also included, in the central and northwest parts of the survey area, are better drained Lackawanna and Valois soils and wetter Morris soils. Also included are small areas of soils that have a nonstony or very stony surface. The included soils range to 3 acres in size and make up as much as 15 percent of the map unit.

Permeability of this Wurtsboro soil is moderate to a depth of 26 inches and slow below that depth. The seasonal high water table is perched above the firm and brittle part of the subsoil (fragipan) in late fall and early spring. Surface runoff is medium or rapid. The available water capacity is moderate. Depth to bedrock is generally more than 60 inches. If the soil has not been limed, it is strongly acid to extremely acid.

Areas of this soil are used for farming, woodland, or recreation or are idle.

This soil is moderately suited to farming, but slopes, the seasonal high water table, and stones hinder cultivation. Drainage is needed for some wet spots. Diversions or terraces help to reduce runoff and to control erosion. Conservation tillage and cover crops also help to maintain productivity of the soil and to control erosion.

This soil is suited to pasture and hayland, but the most productive forage plants are those that tolerate the seasonal high water table. Stocking rates within carrying capacity and restricted grazing during wet periods help to maintain a permanent sod cover and to control erosion.

Potential productivity of northern red oak on this soil is moderately high. There are no limitations to woodland use and management.

The seasonal high water table and slope are moderate limitations to use of this soil as sites for dwellings without basements. The seasonal high water table, slope, and potential frost action are moderate limitations on sites for local roads and streets. The seasonal high water table and slow permeability are severe limitations on sites for septic tank absorption fields. During construction, minimum site disturbance and temporary cover crops help to control erosion.

This soil is in capability subclass IIIe.

Prime Farmland

Prime farmland is one of several kinds of important farmlands defined by the U.S. Department of Agriculture. Identification of prime farmland is a major step in meeting the Nation's needs for food and fiber.

The U.S. Department of Agriculture defines prime farmland as the land that is best suited to producing food, feed, forage, fiber, and oilseed crops. It has the soil quality, growing season, and moisture supply needed to produce a sustained high yield of crops while using acceptable farming methods. Prime farmland produces the highest yields and requires minimal amounts of energy and economic resources, and farming it results in the least damage to the environment.

An area identified as prime farmland must be used for producing food or fiber or must be available for those uses. Thus, urban and built-up land and water areas are not classified as prime farmland.

The general criteria for prime farmland are as follows: a generally adequate and dependable supply of moisture from precipitation or irrigation, favorable temperature and growing-season length, acceptable levels of acidity or alkalinity, few or no rocks, and permeability to air and water. Prime farmland is not excessively erodible, is not saturated with water for long periods, and is not flooded during the growing season. The slope range is mainly from 0 to 8 percent. For more detailed information on the criteria for prime farmland, consult the local staff of the Soil Conservation Service.

The survey area contains about 39,000 acres of prime farmland. That acreage makes up about 6.2 percent of the total acreage in the survey area and is mainly in the west-central part of the county.

The soil map units that make up prime farmland in the survey area are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4, and the location of each unit is shown on the detailed soil maps at the back of this publication. The soil properties and characteristics that affect use and management of the units are described in the section "Detailed Soil Map Units."

Some soils in table 5 are classified as prime farmland if certain limitations of the soil are overcome. The measures needed to overcome the limitations of such soils are given in parentheses after the name of the map unit.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in the survey area. The survey can help planners to maintain or create a and use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

George Stang, district conservationist, and Fred Gaffney, agronomist, both of the Soil Conservation Service, assisted in preparing this section

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

Some general management principles to apply to all soils suitable for crops in Sullivan County are discussed in this section. In 1978, 41,000 acres in the county was used for crops *(7, 12)*. Potential for increased crop production is excellent, particularly in the central part of the county. In most other parts, potential for increased crop production generally is poor.

Soil fertility is a major concern in crop production. On all of the soils in the county, applications of both lime and fertilizer are needed for best crop yields. The amounts needed of both depend on the content of natural lime and plant nutrients in the soil, on the needs of the crop, and on the desired level of yields.

Nitrogen fertilization is especially important for good yields of most crops. The amount of nitrogen in the soil can be increased by using more sod crops and green manure crops and by returning crop residue to the soil. Although nitrogen occurs naturally in soils and can be increased by increasing the level of organic matter, this nutrient is in complex organic forms not quickly available to plants. Nitrogen can also be lost by leaching from rapidly permeable soils, such as Otisville soils, or by a process of denitrification from wetter, less permeable soils, such as Morris soils. It is generally necessary to apply additional nitrogen to supplement the natural nitrogen in the soil.

Phosphorus in the soils of the county is low or very low. Coarse textured soils, such as Otisville and

Tunkhannock soils, are especially low in phosphorus. Adding phosphate fertilizer in amounts determined by soil tests is needed for good crop growth.

Potassium in the soils of the county is low or medium. Soils that have a heavier textured subsoil, for example, Scio and Raynham soils, generally are higher in potassium but still require applications of fertilizer for best yields of most crops.

Soil tilth is structure of the plow layer. It is important for seedling emergence, water infiltration, soil aeration, and the degree of erosion resistance of the soil. Soils that have good tilth have a granular, porous surface. Tillage practices are critical in determining soil tilth *(10)*. Excessive tillage, especially on such finer textured soils as Scio soils, breaks down soil structure and reduces organic matter content. Tillage should be kept to the minimum needed for seedbed preparation and weed control.

Soil tilth can be maintained or improved by increasing the organic matter content. Green manure crops, cover crops, sod crops, animal manure, and crop residue returned to the soil help to improve or to maintain soil tilth.

Drainage is needed because the seasonal high water table is the main limitation on about 106,000 acres of the soils in land capability classes II and III in the county. Excess water in the soil interferes with crop growth and with tillage and other farm operations. The choice of crops or plant varieties is also limited. On Alden, Carlisle, Palms, Neversink, and other soils most field crops cannot be grown without extensive drainage.

Drainage system designs vary with the kind of soil. On some soils, both subsurface and surface drainage systems are required. On other soils, either type of system can be used. In many areas of poorly drained or very poorly drained soils, suitable outlets are difficult to establish.

Drains, either for surface or subsurface drainage, must be more closely spaced in soils that have a slowly permeable or very slowly permeable subsoil, for example, Mardin, Morris, Scriba, and Onteora soils. In some areas of wet, sloping soils, such as Morris and Scriba soils, interceptor or diversion drainage systems are most effective.

Soil erosion is a hazard on about 130,000 acres of soils in land capability classes II and III in the county. The erosion hazard depends on slope, rainfall, kind and amount of cover, and erodibility of the soil.

Soil erosion reduces soil fertility by removing organic matter and finer soil particles in the surface layer, where soil nutrients are concentrated. Erosion also adversely affects soil tilth, increases water losses, and causes harmful sedimentation and water pollution. In extreme cases, gully erosion can interfere with tillage and other farming operations. Soil erosion losses are especially damaging on soils where rooting depths are restricted, for example, on Mardin, Lackawanna, Smartswood, Wellsboro, or Wurtsboro soils.

Erosion control practices include both vegetative and mechanical or structural measures. Cover crops, sod crops in rotation, stripcropping, and grassed waterways help to control erosion. Contour farming, conservation tillage, terracing, and diversions are mechanical or structural erosion control practices *(10)*.

On most soils that have slopes of more than 3 percent, water erosion is a hazard and, if disturbed, erosion control measures are needed. Silty soils that have few coarse fragments, such as Unadilla and Scio soils, are the most erodible.

Sod crops and pasture help to control erosion on most soils in the county. Good management practices, including applications of fertilizer, proper grazing use, and correct seedling mixtures, are needed to maintain a thick cover to control erosion.

The effectiveness of erosion control measures varies with the soil and with other local factors. The local office of the Soil Conservation Service can assist in planning erosion control practices.

Surface stones, boulders, and *rock outcrops* are severe limitations to farming operations in several parts of the county. Use of modern farm machinery is difficult or impossible on the very rocky, bouldery, or extremely stony soils as well as in areas of the Arnot-Rock outcrop complex. These soils generally can be used for limited amounts of hay and pasture.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop

varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland or for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have slight limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e*, *w*, or *s*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); and *s* shows that the soil is limited mainly because it is shallow, droughty, or stony.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w* or *s* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 7. The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

Robert E. Smith, forester, Soil Conservation Service, and Richard Rommel, senior forester, New York State Department of Environmental Conservation, assisted in preparing this section.

A major land use in Sullivan County is forest land. More than 75 percent of the county is forest land, and about 74 percent is classified as commercial forest land *(4)*. The commercial forest land consists of about 16 percent softwood type, 36 percent oak type, and 48 percent northern hardwood type.

Table 8 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed in the tables. The table gives the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number,

indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, that the indicator species can produce. The larger the number, the greater the potential productivity. The number 1 indicates low productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 through 8, high; 9 through 11, very high; and 12 or more, extremely high.

The second part of the symbol, a letter, indicates the major kind of soil limitation for use and management. The letter *R* indicates steep slopes; *X*, stones or rocks on the surface; *W* excessive water in or on the soil; *D*, restricted rooting depth caused by bedrock, hardpan, or other restrictive layer; *S*, sandy texture; and *F*, high content of rock fragments in the soil profile. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, D, S, and F.

In table 8, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that erosion can occur as a result of site preparation or following cutting operations and where the soil is exposed, for example, roads, skid trails, fire lanes, and log handling areas. Forests that are abused by fire or overgrazing are also subject to erosion. The ratings for the erosion hazard are based on the percent of the slope and on the erosion factor K shown in table 16. A rating of *slight* indicates that no particular measures to prevent erosion are needed under ordinary conditions. A rating of *moderate* indicates that erosion control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

The proper construction and maintenance of roads, trails, landings, and fire lanes will help overcome the erosion hazard.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *Slight* indicates that equipment use normally is not restricted either in kind of equipment that can be used or time of year because of soil factors. If soil wetness is a factor, equipment use can be restricted for a period not to exceed 2 months. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If soil wetness is a factor, equipment use is restricted for 2 to 6 months. A rating of *severe* indicates that equipment use is severely restricted either in kind of equipment or season of use. If soil wetness is a factor, equipment use is restricted for more than 6 months.

Choosing the most suitable equipment and timing harvesting and other management operations to avoid seasonal limitations help overcome the equipment limitation.

Seedling mortality refers to the probability of death of naturally occurring or planted tree seedlings as influenced by kinds of soil or topographic conditions. The factors considered in rating the soils for seedling mortality are texture of the surface layer, depth and duration of the water table, rock fragments in the surface layer, rooting depth, and aspect of the slope. A rating of *slight* indicates that under usual conditions the expected mortality is less than 25 percent. A rating of *moderate* indicates that the expected mortality is 25 to 50 percent. Extra precautions are advisable. A rating of *severe* indicates that the expected mortality is more than 50 percent. Extra precautions are important. Replanting may be necessary.

The use of special planting stock and special site preparation, such as bedding, furrowing, or surface drainage, can help reduce seedling mortality.

Windthrow hazard is the likelihood of trees being uprooted (tipped over) by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions are a seasonal high water table and bedrock or a fragipan or other limiting layer. A rating of *slight* indicates that normally no trees are blown down by the wind. Strong winds may break trees but do not uproot them. A rating of *moderate* indicates that moderate or strong winds occasionally blow down a few trees during periods of soil wetness. A rating of *severe* indicates that moderate or strong winds may blow down many trees during periods of soil wetness.

The use of specialized equipment that does not damage surficial root systems during partial cutting operations can help reduce windthrow. Care in thinning or no thinning also can help reduce windthrow.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Common trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *productivity class*, a number, represents an

expected volume produced by the most important trees. This number, expressed as cubic meters per hectare per year, indicates the amount of fiber produced on a fully stocked, even-aged, unmanaged stand. One cubic meter per hectare equals 14.3 cubic feet per acre.

The first tree species listed under common trees for a soil is the indicator species for that soil. The indicator species is the species that is common in the area and is generally the most productive on the soil. The productivity class of the indicator species is the number used for the ordination symbol.

Trees to plant are those that are suited to the soil and are planted for commercial wood production.

Woodland Understory Vegetation

Understory vegetation in the survey area varies depending on elevation. Trees and shrubs, such as sassafras, rhododendron, dogwood, and mountain laurel, are common in lower areas. Common, small trees or shrubs, including water beech, shad bush, striped maple, and witch-hazel, are at intermediate elevations, or about 1,200 to 2,000 feet. Mountain ash, viburnum, ground hemlock, and bush honeysuckle grow at elevations above 2,000 feet.

In addition to the plants listed above, wild blueberries, huckleberries, and blackberries are common in many parts of the county. Aspen and paper birch both grow throughout the county. Many areas support several varieties of ferns, which are a conspicuous part of the ground cover.

Understory vegetation consists of grasses, forbs, shrubs, and other plants. Some woodland, if well managed, can produce enough understory vegetation to support grazing of livestock or wildlife, or both, without damage to the trees.

The quantity and quality of understory vegetation vary with the kind of soil, the age and kind of trees in the canopy, the density of the canopy, and the depth and condition of the litter. The density of the canopy determines the amount of light that understory plants receive.

Recreation

Recreation is an important activity and a big industry in Sullivan County. Hunting, fishing, and hiking are major recreation activities in the Catskill Mountains and the Shawangunk Mountains. Hunting and fishing are also important recreation activities throughout the rest of the county.

More than a hundred ponds, lakes, or reservoirs in the county are available for water sports (fig. 15). The Delaware River, which has been designated a wild and scenic river, provides opportunities for canoeing and fishing.

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 9, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding

Figure 15.—The Wellsboro, Morris, and Oquaga soils around White Lake are used as sites for vacation homes. Areas and facilities for boating and fishing at the lake are plentiful.

during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. The best soils for use as golf fairways are firm when wet, are not dusty when dry, and are not subject to prolonged flooding during the period of use. They

have moderate slopes and no stones or boulders on the surface. The suitability of the soil for tees or greens is not considered in rating the soils.

Wildlife Habitat

Robert Myers, wildlife biologist, Soil Conservation Service, assisted in preparing this section.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 10, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, aspen, cherry, apple, hawthorn, blackberry, shadbush, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, crabapple, and shrub dogwood.

Coniferous plants furnish browse, seeds, and cones. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, hemlock, spruce, fir, and juniper.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, slope, and surface stoniness. Examples of wetland plants are smartweed, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations need to be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to (1) evaluate the potential of areas for residential, commercial, industrial, and recreation uses; (2) make preliminary estimates of construction conditions; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; (5) plan detailed onsite investigations of soils and geology; (6) locate potential sources of gravel, sand, earthfill, and topsoil; (7) plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and (8) predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a

maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm dense layer, stone content, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost-action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 12 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 12 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock, and flooding affect absorption of the effluent. Large stones and bedrock interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to effectively filter the effluent. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is

required to minimize seepage and contamination of ground water.

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope and bedrock can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, and soil reaction affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 13 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the

water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 13, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 14 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly

mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, or organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics. These results are reported in table 18.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 15 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-

weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 16 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓ bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 16, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 17 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 17, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflowing streams, by runoff from adjacent slopes, or by inflow from high tides. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in swamps and marshes or in a closed depression is considered ponding.

Table 17 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable period of occurrence are estimated. Frequency generally is expressed as *none*, *rare*, *occasional*, or *frequent*. *None* means that flooding is not probable. *Rare* means that flooding is unlikely but possible under unusual weather conditions (there is a near 0 to 5 percent chance of flooding in any year). *Occasional* means that flooding occurs infrequently under normal weather conditions (there is a 5 to 50 percent chance of flooding in any year). *Frequent* means that flooding occurs often under normal weather conditions (there is more than a 50 percent chance of flooding in any year). Duration is expressed as *very brief* (less than 2 days), *brief* (2 to 7 days), *long* (7 days to 1 month), and *very long* (more than 1 month). The time of year that floods are most likely to occur is expressed in months. November-May, for example, means that flooding can occur during the period November through May. About two-thirds to three-fourths of all flooding occurs during the stated period.

The information on flooding is based on evidence in the soil profile, namely, thin strata of gravel, sand, silt,

or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons, which are characteristic of soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely, grayish colors or mottles in the soil. Indicated in table 17 are the depth to the seasonal high water table; the kind of water table, that is *perched*, *artesian*, or *apparent;* and the months of the year that the water table commonly is highest. A water table that is seasonally high for less than 1 month is not indicated in table 17.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally below an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

The two numbers in the "High water table—Depth" column indicate the normal range in depth to a saturated zone. Depth is given to the nearest half foot. The first numeral in the range indicates the highest water level. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. "More than 6.0" indicates that the water table is below a depth of 6 feet or that the water table exists for less than a month.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Engineering Index Test Data

Table 18 shows laboratory test data for several pedons sampled at carefully selected sites in the survey area. The pedons are representative of the series described in the section "Soil Series and Their Morphology." The soil samples were tested by the New York State Department of Transportation, Bureau of Soil Mechanics.

The testing methods generally are those of the American Association of State Highway and Transportation Officials (AASHTO) or the American Society for Testing and Materials (ASTM).

The tests and methods are AASHTO classification—

M 145 (AASHTO), D 3282 (ASTM); Unified classification—D 2487 (ASTM); Mechanical analysis—T 88 (AASHTO), D 2217 (ASTM); Liquid limit—T 89 (AASHTO), D 423 (ASTM), Plasticity index—T 90 (AASHTO), D 424 (ASTM); Moisture density, Method A—T 99 (AASHTO), D 698 (ASTM); and Shrinkage—T 92 (AASHTO), D 427 (ASTM).

Parent Material, Landscape Position, and Drainage

Table 19 shows the relationship between parent material, position on the landscape, and drainage for the soils in Sullivan County. First, the soils are grouped based on the type of parent material in which they formed. The types of parent material in the county are glacial till, glacial outwash, lacustrine deposits, alluvial deposits, and organic material. Next, the soils that formed in similar parent material are grouped based on depth to bedrock.

The soils are further categorized based on texture and morphology of the parent material in which they formed. In some instances, soils have similar parent material and similar depth to bedrock, but differ in mean annual soil temperature. These soils are divided into two temperature classes, frigid and mesic. For example, Cheshire soils are mesic and Elka soils are frigid. Finally, the soils are placed in drainage classes. Soils that have the same parent material, soil depth, and landscape position but that are in different drainage classes form a soil catena. Unadilla, Scio, and Raynham soils are an example of a catena. Some soils, such as Manlius soils, are in more than one drainage class and appear more than once on the table.

The general relationships between the soils in the county shown in table 19 supplement the sections "Engineering Properties of Geologic Deposits" and "Formation of the Soils." Detailed information on the morphology and character of the soils is in the section "Soil Series and Their Morphology."

Engineering Properties of Geologic Deposits

Edward Fernau, senior soil engineer, New York State Department of Transportation, assisted in preparing this section.

In Sullivan County the geologic deposits are divided into the following categories: deep till deposits; shallow-to-rock deposits; stratified, coarse textured deposits; stratified, fine textured deposits; and organic deposits. The engineering significance of each geologic deposit is influenced to a great extent by its mode of deposition which, in turn, determines the texture of the material and the internal structure of the landform. Other influences are the position in the landscape and the position of the water table.

Deep till deposits are unstratified, highly variable mixtures of all particle sizes ranging from rock fragments to clay. This scoured material was transported from nearby sources by glacial ice and was deposited as ground moraines or end moraines. Bedrock is generally more than 5 feet below the soil surface, but in some small areas depth to bedrock is less than 5 feet or a few rock outcrops are on the surface. Individual rock and mineral fragments in the soil generally reflect the types of bedrock in the immediate area.

Alden, Cheshire, Elka, Lackawanna, Lewbeach, Mardin, Morris, Neversink, Onteora, Scriba, Suny, Swartswood, Valois, Wellsboro, Willowemoc, and Wurtsboro soils formed in mixed, deep till deposits.

These soils are the most dense and compact of the unconsolidated deposits in the county. In most areas the till has been subjected to the compactive weight of overriding ice. Deep till soils are nearly level to very steep, and in most areas they are nearly level or gently sloping. On many landscapes cut and fill earthwork is involved in most construction. Till soils generally provide stable, relatively incompressible foundations for engineering works. Also, fill material from these deposits, if properly compacted, generally provide stable embankments. Steep cut slopes commonly are subject to surface sloughing and erosion. Alden, Neversink, and Suny soils are subject to ponding.

Shallow-to-rock deposits are a veneer over bedrock. The soils that formed in this material generally are 0.5 foot to 4 feet thick, and in some areas rock outcrops are common. The landforms and topography generally are bedrock controlled.

Manlius and Oquaga soils formed in glacial till deposits over shale bedrock. Arnot, Hawksnest, Lordstown, Mongaup, Torull, and Tuller soils formed in glacial till over sandstone bedrock.

The primary engineering concerns relate to the underlying bedrock and ground water conditions. Other engineering considerations are similar to those for the overlying material described in the detailed map units. Use of this material as fill material is limited in quantity because of the closeness of bedrock.

Stratified, coarse textured deposits are materials dominated by gravel and sand sorted by glacial meltwater into layered or stratified deposits. These deposits include the coarser materials deposited by fluvial action. They are on such geologic landforms as outwash plains and terraces, ice-contact kames and

eskers, and valley trains, lacustrine plains, and flood plains. The strata within these deposits are well sorted or poorly sorted and are of particle size from cobbles to silt. The deposits are generally loose and porous, and *permeability* is moderately rapid to rapid.

Chenango, Otisville, Pompton, Red Hook, Riverhead, and Tunkhannock soils formed in gravelly outwash plains, valley trains, and terraces, kames, eskers, and fans. Scio and Unadilla soils formed in silty material overlying coarse textured material. Bash, Barbour, Pope, and Suncook series formed in sandy or loamy deposits on flood plains.

Coarse textured deposits generally have relatively high strength and low compressibility. They are loose and porous, but most of the deposits are not highly erodible and are subject to settlement when vibrated. Barbour soils are subject to rare flooding, Pope soils are subject to rare and occasional flooding, and Bash and Suncook soils are subject to occasional flooding.

These gravel and sand deposits have many uses as a construction material. Depending on gradation, soundness, and plasticity, they can be used for fill material for highway embankments and for parking areas and developments, and for fill material to decrease stress on underlying soils to allow progress of construction operations. They can also be used as a subbase for pavements, wearing surfaces for driveways, parking lots, and some roads, material for highway shoulders, and free draining backfill for structures and pipes. In addition, they can be used as outside shells to impound water, as slope protection blankets to drain and help stabilize wet, cut slopes, and as sources of sand and gravel for general use.

Stratified, fine textured deposits consist of lacustrine, fine textured sediments transported by glacial meltwater and deposited in quiet, proglacial lakes and ponds. In some places they are flood plain soils on more recent, slack water deposits. Some soils have distinct layers or *laminations* generally of fine sand-sized, silt-sized, and clay-sized particles.

Raynham and Wallington soils formed in deep, lake-laid, fine sand and silt deposits. Philo and Wayland soils are on alluvial flood plains.

These deposits have lower strengths because they have a fine texture and a high moisture content. Those soils that have a high fine sand and silt content have low compressibility but are highly erodible and highly susceptible to frost action. Alluvial soils are subject to flooding.

Fine-grained deposits are difficult to use for engineering work, especially where the soils are on flat surfaces, are wet, and are subject to ponding. Onsite investigation is needed on sites for embankments and heavy structures or buildings to determine strength and settlement characteristics and the effects of ground water.

Organic deposits are mostly accumulations of plant remains. In places they include a minimal amount of mineral soil. They are in very poorly drained depressions and bogs that are covered by water during most of the year.

Carlisle, Greenwood, Ossipee, and Palms soils formed in organic material. They are not suitable for use as sites for foundations for engineering work because they are wet, weak, and highly compressible. Generally, the organic material should be removed to suitable underlying material and replaced with suitable backfill. Filling over organic deposits causes long-term settlement.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(11)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 20 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Inceptisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquept (*Aqu*, meaning water, plus *ept*, from Inceptisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquepts (*Hapl*, meaning minimal horizonation, plus *aquept*, the suborder of the Inceptisols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Aeric* identifies the subgroup that is thought to be better aerated than is typical for the great group. An example is Aeric Haplaquepts.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-silty, mixed, nonacid, mesic Aeric Haplaquepts.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series. Raynham is an example of a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (9)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (11)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Alden Series

The Alden series consists of very deep, very poorly drained soils on till plains. These soils formed in silty colluvium over a substratum of glacial till derived from sandstone, siltstone, and shale. Slope ranges from 0 to 3 percent, but is dominantly less than 2 percent.

Alden soils are commonly near poorly drained and very poorly drained Suny soils, very poorly drained Palms soils, and somewhat poorly drained Morris and Scriba soils. Alden soils have a darker surface layer and a grayer subsoil than Suny soils. Unlike Alden soils, Morris and Scriba soils have a dense, impermeable layer in the subsoil. Unlike Alden soils, Palms soils have thick organic layers.

Typical pedon of Alden silt loam, in the town of Mamakating, 150 feet northeast of Mount Vernon Road from a point 100 yards northwest of the intersection of Mount Vernon Road and Fordham Roads:

A—0 to 12 inches; black (10YR 2/1) silt loam; moderate fine granular structure; friable; common fine and medium roots; moderately acid; abrupt smooth boundary.

Bg—12 to 33 inches; gray (5Y 5/1) silt loam; common medium distinct strong brown (7.5YR 5/6) mottles and few medium distinct yellowish brown (10YR 5/6) mottles; weak medium platy structure; firm; few fine and medium roots; common fine pores; 5 percent rock fragments in lower part; strongly acid; clear smooth boundary.

2Cg1—33 to 42 inches; brown (7.5YR 5/2) channery silt loam; common medium distinct strong brown (7.5YR 5/8) mottles and few medium distinct gray (10YR 5/1) mottles; massive; firm; 30 percent rock fragments; strongly acid; clear smooth boundary.

2Cg2—42 to 61 inches; reddish gray (5YR 5/2) gravelly silt loam; common medium distinct strong brown (7.5YR 5/6) mottles; massive; friable; 15 percent rock fragments. moderately acid.

The solum ranges from 24 to 36 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments range from 0 to 15 percent, by volume, in the solum and from 5 to 35 percent in the substratum.

The A horizon is neutral or has hue of 10YR, value of 2 or 3, and chroma of 0 or 1. Its texture is silt loam or very fine sandy loam. Reaction ranges from very strongly acid to slightly acid.

The B horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 1 or 2. Its texture ranges from silty clay loam to very fine sandy loam. Its consistence is friable or firm. Reaction ranges from very strongly acid to slightly acid.

The C horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 1 or 2. Its texture in the fine earth fraction is silt loam or loam but ranges from fine sandy loam to silty clay loam. Its consistence is friable or firm. Its reaction ranges from strongly acid to slightly acid.

The Alden soils in this survey area are a taxadjunct to the Alden series because they are more acid in reaction in the solum and the substratum and have a thicker, dark surface layer than defined in the range for the series. These differences do not significantly affect use and management of the soils.

Arnot Series

The Arnot series consists of shallow, somewhat excessively drained to moderately well drained soils that formed in glacial till derived from sandstone, siltstone, or shale. Bedrock is at a depth of 10 to 20 inches. Arnot soils are on the sides and the tops of glaciated hills on a bedrock-controlled landscape. Slope ranges from 0 to 70 percent.

Arnot soils are near and formed in parent material similar to that of Lordstown, Oquaga, Manlius, and Tuller soils. They are shallower to bedrock than Lordstown, Oquaga, and Manlius soils and are better drained than Tuller soils.

Typical pedon of Arnot channery loam, in an area of Arnot-Rock outcrop complex, 0 to 15 percent slopes, in the town of Mamakating ⅛ mile northwest of Shawanga Lodge Road and 1 mile north-northeast of the junction of Shawanga Lodge Road and old New York Route 17:

Oe—1 inch to 0; dark brown (7.5YR 3/2) layer of decomposed leaves and twigs; very strongly acid; abrupt smooth boundary.

A—0 to 2 inches; dark grayish brown (10YR 4/2) channery loam; weak fine granular structure; friable; many roots; 20 percent rock fragments; very strongly acid; abrupt smooth boundary.

Bw1—2 to 7 inches; brownish yellow (10YR 6/6) very channery loam; weak fine granular structure; friable; common roots; 35 percent rock fragments; strongly acid; abrupt smooth boundary.

Bw2—7 to 16 inches; yellowish brown (10YR 5/6) very channery loam; weak fine subangular blocky structure; firm; common roots; 45 percent rock fragments; strongly acid; clear smooth boundary.

R—16 inches; hard, light gray sandstone and some quartz.

The thickness of the solum and depth to bedrock range from 10 to 20 inches. Rock fragments are dominantly sandstone or shale. Rock fragments, by volume, range from 35 to 70 percent in the subsoil.

The A horizon has hue of 5YR to 2.5Y, value of 2 or 4, and chroma of 2 or 3. Its structure is granular, and texture of the fine earth fraction is silt loam or loam. Reaction ranges from extremely acid to moderately acid. Some pedons have a thin E horizon.

The B horizon has hue of 2.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6. Its structure is subangular blocky, granular, or platy. Its texture in the fine earth fraction is silt loam or loam. Its reaction ranges from extremely acid to moderately acid.

Some pedons have a thin C horizon.

Barbour Series

The Barbour series consists of very deep, well drained soils on flood plains and terraces. These soils formed in recent alluvial deposits derived from reddish sandstone, siltstone, and shale. Slope ranges from 0 to 3 percent.

Barbour soils are commonly near Fluvaquents, Udifluvents, and Bash, Wayland, and Suncook soils. They are better drained than Bash and Wayland soils, Fluvaquents, and Udifluvents, which are in lower positions on flood plains. They are sandier or more gravelly in the substratum and are redder in color than the similar Pope soils and the wetter Philo soils. They do not contain as much sand as Suncook soils.

Typical pedon of Barbour loam, in the town of Liberty, on the east bank of Shingle Brook, 400 yards southwest of the intersection of Midway and Lenape Roads:

Ap—0 to 8 inches; dark reddish brown (5YR 3/3) loam; weak fine granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.

Bw1—8 to 11 inches; reddish brown (5YR 5/4) loam; weak medium subangular blocky structure; friable; many fine roots; common fine pores; strongly acid; abrupt smooth boundary.

Bw2—11 to 25 inches; yellowish red (5YR 4/6) loam; weak coarse subangular blocky structure; friable; common fine and medium roots; common fine pores; strongly acid; gradual wavy boundary.

Bw3—25 to 30 inches; reddish brown (5YR 4/4) very fine sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; common fine pores; less than 5 percent gravel; moderately acid; clear wavy boundary.

2C—30 to 61 inches; reddish brown (5YR 4/4) very gravelly loamy sand; single grained; loose; common fine and medium roots; 45 percent gravel; moderately acid.

The solum ranges from 18 to 40 inches in thickness. Depth to the 2C horizon ranges from 20 to 40 inches. Depth to bedrock is more than 60 inches. Rock fragments make up 0 to 35 percent of the volume in the horizons above the 2C horizon and 5 to 60 percent in the substratum.

The Ap horizon has hue of 10YR to 5YR, value of 3 or 4, and chroma of 2 to 4. Its texture in the fine earth fraction ranges from silt loam to fine sandy loam. Its reaction ranges from very strongly acid to moderately acid.

The B horizon has hue of 7.5YR to 2.5YR, value of 3 to 5, and chroma of 3 to 6. Its texture in the fine earth fraction ranges from silt loam to sandy loam. Its reaction ranges from very strongly acid to moderately acid.

The 2C horizon has hue of 7.5YR or 5YR, value of 3 to 5, and chroma of 3 or 4. Its texture in the fine earth fraction is loamy fine sand or coarser. Its reaction ranges from very strongly acid to slightly acid.

Bash Series

The Bash series consists of very deep, somewhat poorly drained soils on flood plains. These soils formed in recent alluvial deposits derived from reddish sandstone, siltstone, and shale. Slope ranges from 0 to 3 percent.

Bash soils are near Barbour, Suncook, and Wayland soils. Bash soils are wetter than Barbour and Suncook soils and do not have gravelly or sandy layers. Bash soils are better drained than Wayland soils.

Typical pedon of Bash silt loam, in the town of Fallsburg, 200 yards south of the intersection of Gray and Ranch Hill Roads, in a brushy area:

Ap1—0 to 2 inches; dark reddish gray (5YR 4/2) silt loam; moderate fine granular structure; very friable; many fine and medium roots; common coarse roots; extremely acid; abrupt smooth boundary.

Ap2—2 to 5 inches; dark reddish brown (5YR 3/3) silt loam; weak medium and coarse subangular blocky structure; friable; common medium and fine roots; many fine and common coarse irregular pores; extremely acid; clear smooth boundary.

Bw1—5 to 13 inches; reddish brown (5YR 4/3) silt loam and thin lenses of reddish brown (5YR 4/3) loamy

fine sand; few fine and medium faint yellowish red (5YR 4/6) mottles; weak medium and coarse subangular blocky structure; friable; common fine and few medium roots; common fine vesicular pores; extremely acid; clear smooth boundary.

Bw2—13 to 22 inches; reddish brown (5YR 4/3) silt loam with a few thin lenses of brown (7.5YR 5/2) loamy fine sand; common medium distinct yellowish red (5YR 5/6) mottles; weak medium and coarse subangular blocky structure; friable; few fine and medium roots; common fine vesicular pores; very strongly acid; clear smooth boundary.

C1—22 to 45 inches; reddish gray (5YR 5/2) fine sandy loam; common medium distinct reddish brown (5YR 4/4) and yellowish red (5YR 4/6) mottles; massive; friable; few fine and medium roots; common fine vesicular pores; very strongly acid; gradual wavy boundary.

C2—45 to 61 inches; dark brown (7.5YR 4/2) fine sandy loam and a few lenses of sandy loam; common medium faint dark brown (7.5YR 4/4) and common medium distinct reddish brown (5YR 4/3) mottles; massive; friable; very strongly acid.

The solum ranges from 16 to 40 inches in thickness. Depth to bedrock is more than 60 inches. Gravel content ranges from 0 to 20 percent above the C horizon and from 0 to 50 percent in the C horizon.

The A horizon has hue of 10YR to 2.5YR, value of 3 or 4, and chroma of 2 to 4. Its texture in the fine earth fraction ranges from silt loam to fine sandy loam. Its reaction ranges from extremely acid to strongly acid.

The B horizon has hue of 7.5YR to 2.5YR, value of 3 to 5, and chroma of 3 to 6. Its texture in the fine earth fraction ranges from silt loam to fine sandy loam. Both high and low chroma mottles are in the horizon, and high chroma mottles are in the upper part. Reaction ranges from extremely acid to strongly acid.

The C horizon has hue of 10YR to 5YR, value of 3 to 5, and chroma of 1 to 4. It is massive or its structure is weak platy. Its texture in the fine earth fraction ranges from silt loam to sandy loam. Its reaction ranges from very strongly acid to moderately acid.

Carlisle Series

The Carlisle series consists of very deep, very poorly drained soils in depressional areas, bogs, and marshes on outwash plains and till plains. These soils formed in woody and herbaceous materials that accumulated in bogs and marshy areas. Slope ranges from 0 to 2 percent.

Carlisle soils are commonly near Morris, Scriba, Neversink, and Alden soils on glacial till plains. Unlike Carlisle soils, these other soils formed in mineral matter although in some pedons Alden soils have a thin layer of muck at the surface. Carlisle soils are also near and formed in the same parent material as the shallower, organic Palms soils.

Typical pedon of Carlisle muck, in the town of Mamakating, between phone line and old canal; 1 mile south of Summitville, 2,000 feet east of U.S. Route 209, in a brushy area:

Oa1—0 to 12 inches; black (5YR 2/1) broken face, black (7.5YR 2/1) rubbed, muck (sapric material); less than 5 percent fiber, a trace rubbed; moderate fine granular structure; friable; mainly herbaceous fibers; many fine and medium live roots; slightly acid; clear smooth boundary.

Oa2—12 to 21 inches; black (5YR 2/1) broken face and rubbed, muck (sapric material); about 25 percent fiber, less than 10 percent rubbed; weak coarse platy structure; firm; both woody fragments and herbaceous fibers; neutral; clear wavy boundary.

Oa3—21 to 40 inches; dark reddish brown (5YR 2/2) broken face, black (5YR 2/1) rubbed, muck (sapric material); about 25 percent fiber, about 10 percent rubbed; massive; friable; mainly herbaceous fibers; neutral; clear wavy boundary.

Oa4—40 to 66 inches; dark reddish brown (5YR 3/2) on broken face, dark reddish brown (5YR 2/2) rubbed, muck (sapric material); about 50 percent fiber, about 15 percent rubbed; massive; friable; mainly herbaceous fibers; moderately acid.

The organic deposits are more than 51 inches thick. Depth to bedrock is more than 60 inches. Woody fragments make up 15 to 30 percent of the volume throughout, and range in diameter from 1/4 inch to more than 1 foot.

The surface tier has hue of 5YR, value of 2, and chroma of 1. It is dominantly sapric material. In some pedons it is hemic material or in various proportions of sapric and hemic material. Its reaction ranges from strongly acid to neutral.

The subsurface tiers are neutral or have hue of 5YR to 10YR, value of 2 or 3, and chroma of 0 to 3. They are sapric material and have a rubbed fiber content of less than 10 percent of the organic volume. Their structure is granular, blocky, or platy, or they are massive. Their consistence is friable or firm. Their reaction ranges from moderately acid to neutral.

The bottom tier is neutral or has hue of 5YR to

10YR, value of 2 or 3, and chroma of 0 to 3. It is dominantly sapric material and variable amounts of woody and herbaceous layers. Its structure is weak to coarse blocky or thick platy, or the tier is massive. Its reaction ranges from moderately acid to neutral.

Chenango Series

The Chenango series consists of very deep, well drained and somewhat excessively drained soils on glacial outwash plains, kames, and terraces. These soils formed in glacial outwash derived mainly from sandstone, siltstone, and shale. Slope ranges from 0 to 25 percent.

Chenango soils are commonly near Riverhead and Otisville soils. Chenango soils are higher in content of coarse fragments than Riverhead soils. They are lower in sand content than Otisville soils. Chenango soils are better drained than and are near Red Hook and Pompton soils.

Typical pedon of Chenango gravelly loam, 3 to 8 percent slopes, in the town of Mamakating, 400 feet east of U.S. Route 209, opposite north end of rest area, in woodland:

Oi—1 inch to 0; litter of leaves and twigs.

A—0 to 4 inches; dark brown (7.5YR 4/2) gravelly loam; weak fine granular structure; very friable; many fine and medium roots; 25 percent gravel; very strongly acid; clear smooth boundary.

Bw1—4 to 16 inches; yellowish brown (10YR 5/6) very gravelly loam; weak fine subangular blocky structure; friable; many fine and medium roots; 35 percent gravel; strongly acid; abrupt smooth boundary.

Bw2—16 to 31 inches; yellowish brown (10YR 5/6) very gravelly loam; massive; very friable; common fine and medium roots; 50 percent gravel and cobbles; strongly acid; gradual wavy boundary.

2C—31 to 60 inches; yellowish brown (10YR 5/4) very gravelly loamy coarse sand; single grain; loose; common fine and medium roots; 55 percent gravel and cobbles; strongly acid.

The solum ranges from 24 to 50 inches in thickness. Content of rock fragments ranges from 10 to 30 percent in the A horizon, 20 to 60 percent in the B horizon, and 30 to 70 percent in the C horizon. Rock fragments, on average, make up more than 35 percent of the volume in the particle-size control section. Depth to carbonates is more than 72 inches.

The A horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 or 3. Its texture in the fine earth fraction ranges from sandy loam to silt loam. Its reaction is very strongly acid or strongly acid.

The B horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 3 to 6. Its texture in the fine earth fraction ranges from fine sandy loam to silt loam. Hue of 7.5YR is restricted to the upper part of the B horizon. Reaction ranges from very strongly acid to moderately acid.

The C horizon has hue of 10YR or 2.5Y, value of 3 to 5, and chroma of 2 to 4. Its texture ranges from loamy fine sand to coarse sand or their gravelly or very gravelly analogs. Its reaction ranges from strongly acid to slightly acid.

Cheshire Series

The Cheshire series consists of very deep, well drained soils on the upper parts of valley sides, on hillsides, and on till plains on uplands. These soils formed in glacial till derived from sandstone, siltstone, and shale. Slope ranges from 3 to 60 percent.

Cheshire soils are near and formed in parent material similar to that of very deep Lackawanna and Wellsboro soils. Unlike Cheshire soils, Lackawanna and Wellsboro soils have a fragipan. Cheshire soils are also near Tunkhannock and Valois soils. Cheshire soils are redder than Valois soils and have less gravel than Tunkhannock soils.

Typical pedon of Cheshire channery loam, 25 to 35 percent slopes, stony, in the town of Neversink, on the west side of Sunrise Drive, 800 feet west of New York Route 42, ½ mile north of Thunder Hill Road, in a brushy area:

A—0 to 5 inches; reddish brown (5YR 4/3) channery loam; moderate fine granular structure; very friable; common fine and medium roots; common fine vesicular pores; 20 percent rock fragments; very strongly acid; clear smooth boundary.

Bw1—5 to 11 inches; yellowish red (5YR 5/6) channery loam; weak fine granular structure; very friable; common fine roots; common fine vesicular pores; 25 percent rock fragments; strongly acid; clear smooth boundary.

Bw2—11 to 26 inches; reddish brown (5YR 5/4) channery loam; weak fine and medium subangular blocky structure; friable; common fine roots; common fine vesicular pores; 30 percent rock fragments; strongly acid; gradual smooth boundary.

BC—26 to 36 inches; reddish brown (2.5YR 4/4) channery silt loam; weak coarse subangular blocky

structure; friable; few fine roots; common fine and medium vesicular pores; 30 percent rock fragments; moderately acid; clear smooth boundary.

C—36 to 62 inches; reddish brown (5YR 4/4) channery loam; massive; friable; a few fine roots; common fine and a few medium vesicular pores; 25 percent rock fragments; strongly acid.

The solum ranges from 20 to 36 inches in thickness. Depth to bedrock is more than 60 inches. Content of rock fragments ranges from 5 to 30 percent throughout.

The A horizon has hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 to 4. In unplowed areas in some pedons it has value of 2 and chroma of 1. Its texture in the fine earth fraction ranges from fine sandy loam to silt loam. In unlimed areas its reaction ranges from very strongly acid to moderately acid.

The B horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 4 to 6. Its texture in the fine earth fraction ranges from fine sandy loam to silt loam. Its reaction ranges from very strongly acid to moderately acid.

The C horizon has hue of 2.5YR or 5YR and value and chroma of 3 or 4. Its texture in the fine earth fraction is sandy loam, fine sandy loam, or loam. Its reaction ranges from very strongly acid to moderately acid.

Elka Series

The Elka series consists of very deep, well drained soils that formed in glacial till derived mainly from sandstone and partly from siltstone and shale. Elka soils are on the upper parts of valley sides, plateaus, and mountain sides in the Catskill Mountains. The mean annual air temperature is less than 47 degrees. Slope ranges from 3 to 50 percent.

Elka soils are similar to Cheshire soils. Elka soils are frigid, and Cheshire soils are mesic. Elka soils are also near Lewbeach and Willowemoc soils. Unlike Elka soils, Lewbeach and Willowemoc soils have a fragipan. Elka soils are also better drained than Willowemoc soils.

Typical pedon of Elka loam, 25 to 35 percent slopes, bouldery, in the town of Neversink, on the west side of Moore Hill Road, 400 yards north of the intersection of Moore Hill Road and Furmans-Glade Hill Road, in a wooded area:

A—0 to 1 inch; dark reddish brown (5YR 2/2) loam; moderate fine granular structure; very friable; common fine, many medium roots; 10 percent rock fragments; very strongly acid; clear smooth boundary.

E—1 to 5 inches; dark reddish gray (5YR 4/2) channery fine sandy loam; weak medium granular structure; friable; common fine, many medium roots; common fine and medium vesicular pores; 25 percent rock fragments; very strongly acid; clear smooth boundary.

Bs—5 to 12 inches; dark reddish brown (2.5YR 3/4) channery loam; weak medium granular structure; friable; common fine, many medium roots; common fine and medium vesicular pores; 25 percent rock fragments; very strongly acid; clear smooth boundary.

Bw—12 to 30 inches; reddish brown (5YR 4/4) gravelly sandy loam; weak medium subangular blocky structure; friable; common fine roots; many fine common medium vesicular pores; 25 percent rock fragments; strongly acid; gradual smooth boundary.

BC—30 to 44 inches; yellowish red (5YR 4/6) gravelly sandy loam; massive, separating to fine subangular blocky structure; friable; few fine roots; many fine, common medium vesicular pores; 25 percent rock fragments; strongly acid; gradual smooth boundary.

2C—44 to 61 inches; reddish brown (5YR 4/4) gravelly loamy sand; massive; friable; few fine roots; 20 percent rock fragments; strongly acid.

The solum ranges from 20 to 50 inches in thickness. Depth to bedrock is 60 inches or more. The content of rock fragments ranges from 5 to 25 percent in the solum and from 10 to 25 percent in the C horizon.

The A horizon has hue of 10YR to 2.5YR, value of 2 to 4, and chroma of 1 to 3. Its texture in the fine earth fraction ranges from silt loam to sandy loam. Its reaction ranges from very strongly acid to moderately acid. Some pedons have an E horizon that has value of 3 to 5 and chroma of 2 to 4.

The B horizon has hue of 10YR to 2.5YR, value of 3 to 5, and chroma of 3 to 6. Its texture in the fine earth fraction ranges from silt loam to sandy loam. Its reaction ranges from very strongly acid to moderately acid.

The C horizon has hue of 10YR to 2.5YR, value of 4 or 5, and chroma of 2 to 4. Its texture in the fine earth fraction ranges from sandy loam to loamy coarse sand. Its reaction ranges from moderately acid to very strongly acid.

Fluvaquents

Fluvaquents consist of very deep, somewhat poorly drained to very poorly drained soils that formed in recent alluvium. These soils have little or no profile

development. They are in nearly level areas along streams and are subject to frequent flooding.

Fluvaquents have been mapped in a complex with Udifluvents and are near Pope, Philo, Wayland, Barbour, Bash, and Suncook soils. Stream overflow and the accompanying scouring and cutting commonly shift the soil deposits from place to place.

These soils have been named above the series level in the soil classification system because soil properties differ greatly within a small area. For the same reason a typical pedon is not given.

The solum of Fluvaquents consists mainly of an A horizon 1 to 10 inches thick. Depth to bedrock is generally more than 5 feet. Content of coarse fragments, including gravel, cobblestones, and flagstones, ranges from 0 to 70 percent, by volume.

The A horizon is neutral or has hue of 10YR to 5YR, value of 2 to 4, and chroma of 0 to 2. Its texture in the fine earth fraction ranges from silt loam to sand. Its reaction is slightly acid to very strongly acid.

The C horizon is neutral or has hue of 2.5Y to 5YR, value of 2 to 6, and chroma of 0 to 3. Generally, it has mottles. Its texture in the fine earth fraction ranges from silt loam to sandy loam and in some pedons strata of loamy sand or coarser material. In some pedons it has buried organic layers. Its reaction ranges from slightly acid to very strongly acid.

Greenwood Series

The Greenwood series consists of very deep, very poorly drained soils in depressional areas of the till plains in the Catskill Mountains. These soils formed in organic materials. The mean annual air temperature is less than 47 degrees. Slope ranges from 0 to 2 percent.

Greenwood soils are commonly near Ossipee, Suny, and Onteora soils on till plains. Greenwood soils developed in thicker organic deposits than Ossipee soils. Greenwood soils are wetter than Suny and Onteora soils, which formed in mineral material.

Typical pedon of Greenwood peat, in the town of Neversink, 0.75 mile southeast of the junction of Cooly and Woodard Roads:

Oi—0 to 8 inches; black (10YR 2/1) broken face and rubbed peat (fibric material); about 80 percent fiber, about 60 percent rubbed; weak fine and medium granular structure; very friable; many fine and medium roots and sphagnum moss; extremely acid; clear wavy boundary.

Oe1—8 to 28 inches; dark reddish brown (5YR 3/2) broken face, very dark gray (5YR 3/1) rubbed mucky peat (hemic material); about 60 percent fiber, about 40 percent rubbed; herbaceous and woody fibers; moderate medium granular structure; friable; a few fine and medium live roots; extremely acid; clear smooth boundary.

Oe2—28 to 50 inches; dark reddish brown (5YR 3/2) broken face and rubbed mucky peat (hemic material); about 50 percent fiber, about 30 percent rubbed; massive; herbaceous and woody fibers; extremely acid; clear smooth boundary.

Oe3—50 to 75 inches; very dark brown (10YR 2/2) broken face and rubbed mucky peat (hemic material); about 35 percent fibers, about 20 percent rubbed; massive; mainly herbaceous fibers; extremely acid.

The organic layers are more than 51 inches in thickness. Depth to bedrock is more than 60 inches. Woody fragments, as much as 8 inches in diameter, are throughout. Reaction is very strongly acid or extremely acid in 0.01 molar calcium chloride.

The surface tier has hue of 10YR to 5YR, value of 2 to 4, and chroma of 2 to 4. Materials are sapric, hemic, or fibric.

The subsurface tiers have hue of 10YR to 5YR, value of 2 to 5, and chroma of 2 to 4. Materials are dominantly hemic.

The bottom tier has hue of 10YR to 5YR, value of 2 to 5, and chroma of 2 to 4. Materials are dominantly hemic.

Hawksnest Series

The Hawksnest series consists of shallow, somewhat excessively drained and well drained soils that formed in glacial till. They are on uplands in the Catskill Mountains. Mean annual air temperature is less than 47 degrees. Slope ranges from 0 to 70 percent.

Hawksnest soils formed in the same parent material as Mongaup and Torull soils. Hawksnest soils are shallower than Mongaup soils and better drained than Torull soils. They are also near very deep Elka and Lewbeach soils.

Typical pedon of Hawksnest loam, in an area of Hawksnest-Mongaup loams, strongly sloping, very rocky, in the town of Rockland, 200 feet east of Elm Hollow Road, 1.1 miles north of the intersection of Elm Hollow and Mud Pond Roads, in a forested area:

Oe—2 inches to 0; black (5YR 2/1) partly decomposed leaf litter.

A—0 to 1 inch; dark reddish brown (5YR 2/2) loam;

weak medium granular structure; very friable; many fine and common medium roots; 10 percent rock fragments; very strongly acid; clear wavy boundary.

E—1 to 5 inches; reddish gray (5YR 5/2) channery loam; moderate fine platy structure; friable; many fine and common medium roots; many fine vesicular pores; 20 percent rock fragments; strongly acid; clear wavy boundary.

Bw1—5 to 10 inches; dark reddish brown (5YR 3/4) loam; weak medium and fine subangular blocky structure; friable; common medium and large roots; many fine vesicular pores; 10 percent rock fragments; very strongly acid; clear wavy boundary.

Bw2—10 to 16 inches; brown (7.5YR 4/4) and dark reddish brown (5YR 3/2) silt loam; weak medium and fine subangular blocky structure; friable; common medium and large roots; many fine and medium vesicular pores; 5 percent rock fragments; very strongly acid; abrupt wavy boundary.

R—16 inches; hard, grayish brown sandstone bedrock.

Solum thickness and depth to bedrock range from 10 to 20 inches. Content of rock fragments ranges from 5 to 15 percent, by volume, in the surface layer and from 5 to 35 percent in the subsoil.

The A horizon has hue of 7.5YR or 5YR, value of 2 to 4, and chroma of 1 to 3. Its texture in the fine earth fraction ranges from silt loam to fine sandy loam. Its reaction ranges from extremely acid to strongly acid.

The E horizon has hue of 7.5YR or 5YR, value of 5 or 6, and chroma of 2 or 3. Its texture in the fine earth fraction ranges from loam to sandy loam. Its reaction ranges from extremely acid to strongly acid. Some pedons do not have an E horizon.

The Bw horizon has hue of 10YR to 5YR, value of 3 to 5, and chroma of 3 to 8. Its texture in the fine earth fraction ranges from silt loam to sandy loam. Its reaction ranges from extremely acid to strongly acid.

Lackawanna Series

The Lackawanna series consists of very deep, well drained soils that formed in glacial till derived from shale, siltstone, and sandstone. These soils are on uplands. Slope ranges from 3 to about 50 percent.

Lackawanna soils formed in the same kind of parent material as and are near Wellsboro and Morris soils. Lackawanna soils are better drained than Wellsboro and Morris soils and are in higher positions on the landscape. Near hilltops in some places Lackawanna soils are near moderately deep Oquaga soils. Along valley sides in some places Lackawanna soils are near Cheshire soils. Unlike Cheshire soils, Lackawanna soils have a fragipan. In some areas Lackawanna soils are near the sandier Swartswood and Wurtsboro soils.

Typical pedon of Lackawanna channery loam, 3 to 8 percent slopes, in the town of Tusten, from intersection of Gable Road and New York Route 97, 100 yards north along New York Route 97, then 1.25 miles east along gravel road, 50 feet south of gravel road, in a wooded area:

Oe—2 inches to 0; black (5YR 2/1) well decomposed organic litter; extremely acid.

E—0 to 3 inches; brown (7.5YR 5/2) channery loam; weak medium subangular blocky structure parting to weak fine and medium granular; friable; many fine, common medium, and few coarse roots; 15 percent rock fragments; extremely acid; abrupt wavy boundary.

Bw1—3 to 13 inches; reddish brown (5YR 4/4) channery loam; weak medium subangular blocky structure parting to weak fine and very fine granular; very friable; many fine, common medium, and few coarse roots; many fine vesicular pores; 30 percent rock fragments; extremely acid; gradual wavy boundary.

Bw2—13 to 32 inches; reddish brown (5YR 5/4) channery loam; moderate medium and fine subangular blocky structure; friable; common fine and few medium roots; common fine and medium vesicular pores, few fine tubular pores; 20 percent rock fragments; extremely acid; clear smooth boundary.

Bx—32 to 61 inches; reddish brown (2.5YR 4/4) channery loam; few coarse distinct yellowish red (5YR 5/6) mottles; weak very coarse prismatic structure, moderate coarse subangular blocky structure within prisms; prisms have reddish brown (5YR 5/3) face, yellowish red (5YR 5/6) border; firm and brittle; common fine and medium vesicular pores, few medium tubular pores; thin to moderately thick clay skins in most pores; 17 percent rock fragments; strongly acid.

The solum ranges from 40 to 75 inches in thickness. Depth to bedrock is more than 60 inches. Depth to the fragipan ranges from 17 to 36 inches. Rock fragments range from 15 to 40 percent, by volume, in the horizons above the Bx horizon and from 10 to 50 percent in the Bx horizon.

Some pedons have an Ap or A horizon that has hue of 10YR to 5YR and value and chroma of 2 to 4. Texture of either in the fine earth fraction is silt loam or

loam. Reaction ranges from extremely acid to strongly acid.

The E horizon has hue of 10YR to 5YR, value of 3 to 6, and chroma of 2 or 3. Its texture in the fine earth fraction ranges from silt loam to sandy loam. Its reaction ranges from extremely acid to strongly acid.

The Bw horizon has hue of 10YR to 2.5YR, value of 4 or 5, and chroma of 4 to 6. Its texture in the fine earth fraction is silt loam or loam. Its consistence is very friable or friable. Its reaction ranges from extremely acid to strongly acid.

The Bx horizon has hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 2 to 4. Its texture in the fine earth fraction is silt loam to sandy loam. Its structure within prisms is platy and blocky, or the horizon is massive. Its consistence is firm and brittle. Its reaction is very strongly acid to moderately acid.

Lewbeach Series

The Lewbeach series consists of very deep, well drained soils that formed in glacial till derived from sandstone, siltstone, and shale. They are on hillsides and hilltops on uplands in the area of the Catskill Mountains. The mean annual air temperature is less than 47 degrees. Slope ranges from 3 to 50 percent.

Lewbeach soils formed in the same kind of parent material as and are near Elka, Willowemoc, Onteora, and Suny soils. Unlike Elka soils, Lewbeach soils have a fragipan. Lewbeach soils are better drained than Willowemoc, Onteora, and Suny soils. Lewbeach soils are also near moderately deep Mongaup soils and are similar to Lackawanna soils. Lewbeach soils are frigid, and Lackawanna soils are mesic.

Typical pedon of Lewbeach silt loam, 15 to 25 percent slopes, in the town of Liberty, on the west side of Revonah Hill Road, 0.6 mile north of the intersection of Benton Hollow and Revonah Hill Roads, 0.2 mile south of Camp Catskill:

Oi—1 inch to 0; litter of leaves and twigs.

A—0 to 3 inches; dark reddish brown (5YR 3/2) silt loam; moderate medium granular structure; very friable; many fine and medium roots; many fine and medium vesicular pores; 10 percent rock fragments; very strongly acid; clear smooth boundary.

E—3 to 8 inches; dark reddish gray (5YR 4/2) silt loam; weak medium and fine granular structure; very friable; common fine and medium roots, a few large roots; common fine and a few medium vesicular pores; 10 percent rock fragments; very strongly acid; clear wavy boundary.

Bw1—8 to 20 inches; yellowish red (5YR 4/6) gravelly loam; weak medium and fine subangular blocky structure; friable; common fine and medium roots, few large roots; many fine and medium and few large vesicular pores; 15 percent rock fragments; strongly acid; clear wavy boundary.

Bw2—20 to 28 inches; yellowish red (5YR 5/6) gravelly sandy loam; weak medium subangular blocky structure parting to moderate medium granular; friable; a few fine and medium roots; common fine and medium vesicular pores, few fine and medium tubular pores; 20 percent rock fragments; strongly acid; abrupt wavy boundary.

E'—28 to 33 inches; light reddish brown (5YR 6/3) gravelly sandy loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure, friable; common fine and medium vesicular pores, few fine tubular pores; 20 percent rock fragments; strongly acid; clear wavy boundary.

Bx—33 to 61 inches; reddish brown (2.5YR 5/4) gravelly sandy loam; a few medium distinct yellowish red (5YR 5/6) mottles; weak very coarse prismatic structure, massive within prisms, prism face is reddish brown (5YR 5/3); firm and brittle; common medium vesicular pores, few medium tubular pores; thin clay coatings on sides of some pores; 25 percent rock fragments; strongly acid.

The solum ranges from 40 to 70 inches or more in thickness. Depth to bedrock is more than 60 inches. Depth to the fragipan ranges from 20 to 36 inches. Content of rock fragments ranges from 5 to 15 percent, by volume, in the A and E horizons, 15 to 35 percent in the Bw and E' horizons, and from 15 to 50 percent in the Bx and C horizons.

The A horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 2 or 3. Its texture in the fine earth fraction ranges from silt loam to fine sandy loam. Its reaction is very strongly acid or strongly acid.

The E horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 2 or 3. Its texture in the fine earth fraction ranges from silt loam to fine sandy loam. Its reaction is very strongly acid or strongly acid.

The Bw horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 3 to 6. Its texture in the fine earth fraction ranges from loam to sandy loam. Its reaction is very strongly acid or strongly acid.

The Bx horizon has hue of 2.5YR to 7.5YR, value of 3 to 5, and chroma of 2 to 4. Its texture in the fine earth fraction is sandy loam, fine sandy loam, or loam. In some pedons it has gray or brown mottles. Prism face

colors range from weak red (2.5YR 5/2) to light brown (7.5YR 6/4). Prism interiors have platy or blocky structure, or they are massive. Reaction is very strongly acid to moderately acid.

Some pedons have a C horizon that has color and texture similar to those of the Bx horizon.

Lordstown Series

The Lordstown series consists of moderately deep, well drained soils that formed in glacial till derived from sandstone, siltstone, shale, and conglomerate. These soils are on the sides and the tops of hills on bedrock-controlled uplands. Slope ranges from 0 to 35 percent.

Lordstown soils formed in the same kind of parent material as and are near the shallow Arnot and Tuller soils. They are also near the very deep Swartswood, Wurtsboro, Lackawanna, and Wellsboro soils. Unlike Lordstown soils, these soils have a firm, dense fragipan.

Typical pedon of Lordstown silt loam, in an area of Arnot-Lordstown complex, 15 to 35 percent slopes, very rocky, in the town of Mamakating, 0.3 mile northeast of the intersection of Mastens Lake and Callahans Road, 0.2 mile east of Callahans Road along gravel lane, 100 feet north of lane, in a wooded area:

Oi—3½ to 3 inches; dark reddish brown (5YR 3/3) largely undecomposed leaves, twigs, and roots.

Oe—3 inches to 0; black (N 2/0) partly decomposed leaves and roots and as much as 50 percent, by volume, mineral material; weak fine and medium granular structure; very friable; many fine, common medium, and few coarse roots; 2 percent rock fragments; very strongly acid; abrupt wavy boundary.

E—0 to 3 inches; brown (7.5YR 5/2) silt loam; weak fine subangular blocky structure; friable; many fine and few medium and coarse roots; common fine pores; 5 percent rock fragments; common skeletons; very strongly acid; abrupt wavy boundary.

Bw1—3 to 11 inches; dark brown (7.5YR 4/4) channery loam; weak fine and medium subangular blocky structure; friable; many fine and few medium and coarse roots; common fine and few medium pores; 15 percent rock fragments, 2 percent more than 3 inches in diameter; strongly acid; clear wavy boundary.

Bw2—11 to 17 inches; brown (7.5YR 5/4) channery loam; weak medium and coarse subangular blocky structure; friable; common fine and few medium roots; common fine pores; 20 percent rock fragments, 3 percent more than 3 inches in diameter; moderately acid; clear irregular boundary.

BC—17 to 25 inches; brown (10YR 5/3) and yellowish brown (10YR 5/4) channery loam; weak coarse subangular blocky structure; friable; many fine and few medium pores; 30 percent rock fragments, 5 percent more than 3 inches in diameter; strongly acid.

R—25 inches; hard, gray sandstone bedrock.

The solum ranges from 20 to 40 inches in thickness. Depth to bedrock ranges from 20 to 40 inches. Rock fragments, which are dominantly flat and angular, make up 15 to 35 percent, by volume, of the solum and 15 to 40 percent of the C horizon.

The E horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 to 4. Its texture is loam or silt loam. Its reaction ranges from very strongly acid to slightly acid.

The B horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6. Its texture in the fine earth fraction is loam or silt loam. Its reaction ranges from moderately acid to very strongly acid.

Some pedons have a C horizon that has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 2 to 4. In some of these pedons the horizon has mottles. Its texture in the fine earth fraction ranges from fine sandy loam to silt loam. Its reaction is moderately acid to strongly acid.

Manlius Series

The Manlius series consists of moderately deep, well drained to excessively drained soils on bedrock-controlled uplands. These soils formed in glacial till derived mainly from shale and some siltstone and sandstone. Slope ranges from 3 to 25 percent.

Manlius soils are near and formed in parent material similar to that of Arnot, Lordstown, Oquaga, and Tuller soils. Manlius soils are deeper than Arnot and Tuller soils and are better drained than Tuller soils. They are yellower than Oquaga soils and have more rock fragments than Lordstown soils. They are also near the very deep, slightly wetter Mardin soils.

Typical pedon of Manlius channery silt loam, 8 to 15 percent slopes, in the town of Mamakating, on the south side of Mountain Road, 0.5 mile north of the intersection of Mountain and Buttonwood Roads:

Oe—1 inch to 0; black (N 2/0) mostly decomposed organic matter.

A—0 to 2 inches; very dark grayish brown (10YR 3/2)

channery silt loam; weak fine granular structure; friable; many fine and common medium roots; 15 percent fine shale chips; strongly acid; abrupt smooth boundary.

BA—2 to 9 inches; dark yellowish brown (10YR 4/4) channery silt loam; weak medium granular structure; friable; common fine and medium roots; 20 percent shale chips; strongly acid; clear smooth boundary.

Bw—9 to 15 inches; yellowish brown (10YR 5/6) channery silt loam; weak medium subangular blocky structure; friable, common fine roots; 30 percent shale fragments; strongly acid; clear wavy boundary.

BC—15 to 22 inches; yellowish brown (10YR 5/6) very channery silt loam; weak medium platy structure; friable; few fine roots; 60 percent shale fragments; strongly acid; clear wavy boundary.

C—22 to 27 inches; yellowish brown (10YR 5/4) very channery silt loam; massive; friable; 60 percent soft, grayish and brownish shale fragments; strongly acid; clear wavy boundary.

R—27 inches; dark grayish brown fractured shale.

The solum ranges from 15 to 30 inches in thickness. Depth to bedrock ranges from 20 to 40 inches. Shale fragments range from 15 to 35 percent, by volume, in the A and BA horizons and from 30 to 60 percent in the B and C horizons.

The A horizon has hue of 7.5YR to 2.5Y, value of 3 or 4, and chroma of 2 or 3. Its texture in the fine earth fraction is silt loam or loam. Its reaction ranges from extremely acid to strongly acid.

The B horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 3 to 6. Its texture in the fine earth fraction is silt loam or loam. Its reaction ranges from extremely acid to strongly acid.

The C horizon has hue of 10YR or 2.5Y, value of 4 or 5, and chroma of 2 to 4. Its texture in the fine earth fraction is silt loam or loam. Its reaction ranges from very strongly acid to slightly acid.

Mardin Series

The Mardin series consists of very deep, moderately well drained soils on uplands. These soils formed in glacial till derived from sandstone, siltstone, and shale. Slope ranges from 3 to 15 percent.

Mardin soils are commonly near Swartswood, Valois, Wurtsboro, and Scriba soils. Swartswood soils are well drained, and Scriba soils are somewhat poorly drained. Swartswood, Wurtsboro, and Scriba soils generally have a sandier texture. Valois soils do not have a fragipan and are better drained than Mardin soils. Mardin soils are near and are deeper than the bedrock-controlled, moderately deep or shallow Manlius, Lordstown, and Arnot soils on hillsides and hilltops.

Typical pedon of Mardin gravelly silt loam, 8 to 15 percent slopes, in the town of Mamakating, 40 feet east of Horton Road, 150 feet southwest of the intersection of Horton and Roosa Gap Roads:

A—0 to 4 inches; very dark brown (10YR 2/2) gravelly silt loam; weak medium granular structure; friable; many fine and common medium roots; 15 percent gravel; very strongly acid; clear smooth boundary.

BE—4 to 12 inches; dark brown (10YR 4/3) gravelly silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; 15 percent gravel; strongly acid; clear smooth boundary.

Bw1—12 to 20 inches; brownish yellow (10YR 6/6) gravelly silt loam, common fine distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; friable; common fine roots; common fine and medium pores; 15 percent rock fragments; moderately acid; clear smooth boundary.

Bx—20 to 61 inches; dark yellowish brown (10YR 4/4) gravelly silt loam; common medium distinct yellowish brown (10YR 5/8) and very pale brown (10YR 7/3) mottles; weak coarse prismatic structure; massive within prisms; prisms separated by streaks, 1 inch wide, of very pale brown (10YR 7/3) loam; firm and brittle; few fine roots along prism faces; common fine and medium pores with thin clay linings; many black and very dark brown manganese stains; 20 percent rock fragments; moderately acid.

The solum ranges from 40 to 70 inches in thickness. Depth to the top of the fragipan ranges from 14 to 26 inches. Depth to bedrock is more than 60 inches. Content of rock fragments ranges from 5 to 35 percent, by volume, above the fragipan and 20 to 40 percent in the fragipan.

The A horizon has hue of 2.5Y to 7.5YR and value and chroma of 2 to 4. Its texture in the fine earth fraction is silt loam or loam. Its reaction ranges from extremely acid to moderately acid.

The BE and Bw horizons have hue of 2.5Y to 7.5YR, value of 4 to 6, and chroma of 3 to 8. Their textures in the fine earth fraction are silt loam or loam. Their reaction ranges from extremely acid to moderately acid.

The Bx horizon has hue of 2.5Y to 7.5YR, value of 3 to 5, and chroma of 2 to 4. Its texture in the fine earth

fraction is silt loam or loam. Its reaction ranges from very strongly acid to slightly acid.

Mongaup Series

The Mongaup series consists of moderately deep, moderately well drained and well drained soils that formed in glacial till derived from sandstone, siltstone, and shale. These soils are on hillsides and hilltops on glaciated, bedrock-controlled uplands. The mean annual air temperature is less than 47 degrees. Slope ranges from 0 to 35 percent.

Mongaup soils formed in the same parent material as Hawksnest and Torull soils. Mongaup soils are deeper than Hawksnest and Torull soils and are better drained than Torull soils. Mongaup soils are also near very deep Elka and Lewbeach soils.

Typical pedon of Mongaup loam, 0 to 15 percent slopes, in an area of Hawksnest-Mongaup loams, strongly sloping, very rocky, in the town of Liberty, on the west side of Fox Mountain Road, 300 feet north of the intersection of Fox Mountain and Elk Point Roads:

A—0 to 3 inches; dark reddish brown (5YR 3/2) loam; weak fine granular structure; friable; many fine and medium roots; many fine vesicular pores; 10 percent rock fragments; very strongly acid; abrupt wavy boundary.

Bw1—3 to 12 inches, yellowish red (5YR 5/6) gravelly loam; weak medium subangular blocky structure; friable; many fine and medium roots, few large roots; common fine and medium vesicular pores, few medium tubular pores; 20 percent rock fragments, very strongly acid; clear wavy boundary.

Bw2—12 to 18 inches; strong brown (7.5YR 5/6) gravelly loam; weak medium subangular blocky structure; friable; many fine and medium roots, few large roots; common fine and medium vesicular pores, few medium tubular pores; 20 percent rock fragments; strongly acid; clear smooth boundary.

BC—18 to 22 inches; brown (7.5YR 4/4) sandy loam; common coarse distinct pale brown (10YR 6/3) and reddish yellow (7.5YR 6/8) mottles; weak coarse subangular blocky structure; friable; many fine and medium vesicular pores, common tubular pores; 10 percent rock fragments; strongly acid.

R—22 inches; hard, grayish brown sandstone bedrock.

The solum ranges from 16 to 40 inches in thickness. Depth to bedrock ranges from 20 to 40 inches. Content of rock fragments ranges from 5 to 35 percent, by volume, throughout.

The A horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 0 to 3. Its texture in the fine earth fraction ranges from sandy loam to silt loam. Reaction ranges from extremely acid to strongly acid. Some pedons have an O or E horizon.

The B horizon has hue of 2.5YR to 10YR, value of 3 to 5, and chroma of 2 to 6. Its texture in the fine earth fraction ranges from sandy loam to silt loam. Its reaction ranges from extremely acid to strongly acid. Some pedons have a Bh or Bs horizon. Some pedons have high chroma mottles.

Some pedons have a C horizon that is similar in color and texture to the B horizon. Bedrock is generally massive sandstone but in some pedons is beds of siltstone or shale.

Morris Series

The Morris series consists of very deep, somewhat poorly drained soils on till plains and the lower parts of hillsides on glaciated uplands. These soils formed in glacial till derived from shale, siltstone, and sandstone. Slope ranges from 0 to 15 percent.

Morris soils formed in parent material similar to that of the better drained Lackawanna and Wellsboro soils. In the lower positions on the landscape, very poorly drained Alden soils and poorly drained or very poorly drained Neversink soils are near Morris soils. Unlike Neversink and Alden soils, Morris soils have a fragipan.

Typical pedon of Morris loam, 3 to 8 percent slopes, in the town of Bethel, 500 feet south of West Shore Drive, 0.2 mile east of Perry Road, 80 feet west of pond, in a pasture:

A—0 to 2 inches; dark brown (7.5YR 3/2) loam; weak fine granular structure; friable; many fine roots; 10 percent rock fragments; strongly acid; abrupt smooth boundary.

E—2 to 6 inches; reddish gray (5YR 5/2) loam; common fine prominent reddish brown (2.5YR 4/4) mottles; weak medium subangular blocky structure; friable; many fine roots; common medium pores; 10 percent rock fragments; strongly acid; clear smooth boundary.

Bw—6 to 13 inches; yellowish red (5YR 4/6) ped interiors, reddish gray (5YR 5/2) ped faces, gravelly loam; common medium faint reddish brown (5YR 5/4) mottles; weak medium subangular blocky structure; friable; common fine and few medium roots; common large and medium pores; 15 percent rock fragments; strongly acid; clear smooth boundary.

E'—13 to 20 inches; reddish brown (5YR 5/3) ped interiors, weak red (2.5YR 5/2) ped faces, gravelly loam; weak medium subangular blocky structure; friable; few fine roots; few large and medium pores; 20 percent rock fragments; strongly acid; abrupt wavy boundary.

Bx—20 to 60 inches; reddish brown (2.5YR 4/4) gravelly loam; moderate very coarse prisms separated by pinkish gray (5YR 6/2) streaks with yellowish red (5YR 4/6) borders; massive within prisms; firm and brittle; no roots; common medium pores with clay linings; 20 percent rock fragments; strongly acid.

The solum ranges from 40 to 75 inches in thickness. Depth to the fragipan ranges from 10 to 22 inches. Rock fragments range from 10 to 15 percent, by volume, in the A, E, and Bw horizons and from 15 to 45 percent in the Bx and C horizons.

The A horizon has hue of 5YR to 10YR, value of 2 to 5, and chroma of 1 to 4. The E horizon has hue of 5YR to 10YR, value of 3 to 6, and chroma of 2 or 3. The texture of the A and E horizons in the fine earth fraction is loam or silt loam. Their reaction ranges from very strongly acid to moderately acid.

The Bw horizon has hue of 5YR to 10YR, value of 3 to 7, and chroma of 1 to 6; part of the horizon above 20 inches has chroma of 2 or less. Its texture in the fine earth fraction is loam or silt loam. Its reaction ranges from very strongly acid to moderately acid.

The Bx horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 2 to 6. Prism faces are commonly gray (N 5/0), light gray (10YR 7/2), or pale brown (10YR 6/3). Texture in the fine earth fraction ranges from loam to silty clay loam. Reaction in the upper part of the Bx horizon is similar to that in the Bw horizon, but ranges to slightly acid in the lower part. The Bw and Bx horizons are mottled.

Some pedons have a C horizon that has colors similar to those of the Bx horizon. It is firm, and its texture in the fine earth fraction is loam or silt loam. Its reaction ranges from strongly acid to slightly acid.

Neversink Series

The Neversink series consists of very deep, poorly drained or very poorly drained soils in level or depressional areas of till plains and along small drainageways. These soils formed in acid, glacial till derived from sandstone, siltstone, and shale. Slope ranges from 0 to 3 percent.

Neversink soils formed in the same kind of parent material as Swartswood, Wurtsboro, and Scriba soils. Neversink soils are wetter than these soils. Unlike Neversink soils, Swartswood, Wurtsboro, and Scriba soils have a fragipan. Neversink soils are also near Morris and Alden soils. Neversink soils are sandier than Morris and Alden soils. They are wetter than Morris soils. Unlike Neversink soils, Morris soils have a fragipan. Neversink soils are less gray and sandier than Alden soils.

Typical pedon of Neversink loam, in the town of Fallsburg, 300 yards east of the intersection of Church Road and Glen Wild Road, 500 feet north of Church Road, in a power line right-of-way:

Oi—2 inches to 0; slightly decomposed leaves, roots, and other organic litter; very strongly acid.

A—0 to 3 inches; dark brown (7.5YR 4/2) loam; weak medium granular structure; friable; many fine roots; 10 percent rock fragments; strongly acid; clear wavy boundary.

E—3 to 5 inches; grayish brown (10YR 5/2) loam; common coarse distinct yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; common fine roots; 10 percent rock fragments; strongly acid; abrupt wavy boundary.

Bw1—5 to 14 inches; reddish gray (5YR 5/2) gravelly loam; common medium distinct strong brown (7.5YR 5/8) mottles; weak fine subangular blocky structure; friable; few fine roots; common fine and medium pores; some pores filled with A horizon material; 20 percent rock fragments; strongly acid; clear wavy boundary.

Bw2—14 to 21 inches; brown (7.5YR 5/4) gravelly fine sandy loam; common coarse distinct light brownish gray (10YR 6/2) mottles and common coarse distinct strong brown (7.5YR 5/8) mottles; weak medium subangular blocky structure; firm; common fine pores; 25 percent rock fragments; very strongly acid.

C—21 to 60 inches; reddish brown (5YR 5/3) gravelly sandy loam; few medium distinct strong brown (7.5YR 5/6) mottles; massive; firm; common fine and medium pores; 25 percent rock fragments; strongly acid.

The solum ranges from 20 to 40 inches in thickness. Rock fragments range from 5 to 35 percent, by volume, in the A, E, and B horizons and from 20 to 50 percent in the C horizon. Depth to bedrock is more than 60 inches.

The A horizon has hue of 10YR to 5YR, value of 2 to 4, and chroma of 1 or 2. Its texture in the fine earth

fraction ranges from silt loam to sandy loam. Its reaction ranges from extremely acid to strongly acid.

The E horizon has hue of 10YR to 5YR, value of 4 to 6, and chroma of 1 or 2. Its texture in the fine earth fraction ranges from loam to sandy loam. Its reaction ranges from extremely acid to strongly acid. Some pedons do not have an E horizon.

The B horizon in the upper part has hue of 10YR to 5YR, value of 4 to 6, and chroma of 1 or 2. In the lower part it has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 to 4. Its texture in the fine earth fraction ranges from loam to sandy loam. Its reaction ranges from extremely acid to strongly acid.

The C horizon has hue of 10YR to 5YR, value of 4 or 5, and chroma of 2 to 4. Its texture in the fine earth fraction ranges from loam to sandy loam. Its consistence is friable or firm. Its reaction ranges from extremely acid to strongly acid.

Onteora Series

The Onteora series consists of very deep, somewhat poorly drained soils that formed in glacial till derived from sandstone, siltstone, and shale. These soils are on till plains and the lower parts of hillsides on uplands. The mean annual air temperature is less than 47 degrees. Slope ranges from 0 to 15 percent.

Onteora soils formed in the same kind of parent material as Lewbeach, Willowemoc, and Suny soils. Onteora soils are wetter than Lewbeach and Willowemoc soils, but are better drained than Suny soils. Onteora soils are also near shallow Torull soils.

Typical pedon of Onteora loam, 3 to 8 percent slopes, in the town of Liberty, 500 yards southwest of Matawa Lake on the east side of Lenapee Road, 1 mile northeast of the high-voltage power line crossing Lenapee Road:

Oe—3 inches to 0; black (10YR 2/1) partly decomposed organic litter.

A—0 to 4 inches; dark brown (7.5YR 4/2) loam; weak medium granular structure; friable; many fine and medium roots; 10 percent rock fragments; very strongly acid; abrupt wavy boundary.

Bw1—4 to 9 inches; brown (7.5YR 5/4) gravelly fine sandy loam; common medium distinct strong brown (7.5YR 5/8) and pinkish gray (7.5YR 6/2) mottles; weak medium subangular blocky structure; friable; common fine roots; few fine vesicular pores; 15 percent rock fragments; strongly acid; clear smooth boundary.

Bw2—9 to 14 inches; reddish brown (5YR 5/4) gravelly loam; common medium distinct pinkish gray (5YR 6/2) and strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine roots; few fine vesicular pores; 20 percent rock fragments; strongly acid; clear wavy boundary.

Bx1—14 to 26 inches; reddish brown (5YR 5/4) gravelly loam; weak very coarse prismatic structure; coarse subangular blocky structure within prisms; prisms separated by streaks of pale brown (10YR 6/3) fine sandy loam with strong brown (7.5YR 5/8) borders; very firm and brittle; common fine and few medium vesicular pores; some thin clay coatings on pores; 25 percent rock fragments; strongly acid; clear smooth boundary.

Bx2—26 to 60 inches; reddish brown (5YR 4/4) gravelly loam; weak very coarse prismatic structure; weak fine platy structure within prisms; prisms separated by streaks of pale brown (10YR 6/3) fine sandy loam with strong brown (7.5YR 5/6) borders; firm and brittle; common fine and medium and few coarse vesicular pores; common thin clay coatings on pores and ped faces; 25 percent rock fragments; strongly acid.

The solum ranges from 25 to 60 inches in thickness. Depth to bedrock is more than 60 inches. Depth to the fragipan ranges from 10 to 25 inches. Rock fragments range from 5 to 35 percent, by volume, in the A horizon and in the upper part of the B horizon and from 15 to 50 percent in the lower part of the subsoil (fragipan) and in the C horizon.

The A horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 2 or 3. Its texture in the fine earth fraction ranges from silt loam to fine sandy loam. Its reaction ranges from extremely acid to moderately acid.

Some pedons have an E horizon that has hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 or 3. Its texture in the fine earth fraction ranges from loam to sandy loam. Its reaction ranges from extremely acid to strongly acid.

The Bw horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 6. It has mottles of gray, brown, or yellowish red. Its texture in the fine earth fraction ranges from silt loam to sandy loam. Its reaction is very strongly acid to moderately acid.

The Bx horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 2 to 4. It has mottles of gray, brown, or yellowish red. Its texture in the fine earth fraction ranges from silt loam to sandy loam. In some pedons prism interiors in the fragipan have platy or blocky structure, or they are massive. Reaction of the horizon is very strongly acid to moderately acid.

Some pedons have a C horizon that has colors and textures the same as those of the Bx horizon. The Bx and C horizons are firm or very firm.

Oquaga Series

The Oquaga series consists of moderately deep, well drained to excessively drained soils that formed in glacial till derived from shale, siltstone, and sandstone. Oquaga soils are on the sides and the tops of hills in bedrock-controlled uplands. Slope ranges from 0 to 35 percent.

Oquaga soils formed in parent material similar to that of the more shallow Arnot and Tuller soils. They are also near deep Lackawanna, Wellsboro, Cheshire, Swartswood, and Wurtsboro soils.

Typical pedon of Oquaga very channery silt loam, in an area of Oquaga-Arnot complex, 8 to 15 percent slopes, in the town of Bethel, ⅓ mile west on New York Route 17B from the intersection of New York Route 17B and White Lake Road, ⅓ mile north and ¼ mile west from New York Route 17B, along gravel road:

Oi—2 inches to 0; part decomposed roots, leaves, and twigs.

A—0 to 4 inches; dark reddish brown (5YR 3/3) very channery silt loam; weak fine subangular blocky structure; very friable; many fine and common medium and coarse roots; 40 percent rock fragments; strongly acid; clear smooth boundary.

Bw1—4 to 11 inches; dark red (2.5YR 3/6) and red (2.5YR 4/6) very channery loam; weak coarse subangular blocky structure parting to fine granular; very friable; many fine and common medium and coarse roots; many fine irregular pores; 36 percent rock fragments; strongly acid; clear wavy boundary.

Bw2—11 to 28 inches; reddish brown (2.5YR 4/4) very channery loam; very weak medium subangular blocky structure; very friable; many fine and few medium roots in the upper part of the horizon, many fine roots in lower part; many fine irregular pores; 45 percent rock fragments; strongly acid; gradual wavy boundary.

BC—28 to 34 inches; reddish brown (2.5YR 4/4) and dark reddish brown (2.5YR 3/4) very channery loam; massive; friable; few medium roots; many fine irregular pores; 45 percent rock fragments; strongly acid.

R—34 inches; weak red thinly bedded shale bedrock.

Solum thickness and depth to bedrock range from 20 to 40 inches. Rock fragments range from 30 to 60 percent, by volume.

The A horizon has hue of 2.5YR to 10YR, value of 3 or 4, and chroma of 2 to 4. Its texture in the fine earth fraction is loam or silt loam. Its reaction ranges from extremely acid to moderately acid. Some pedons have an Ap horizon that has characteristics similar to those of the A horizon.

The Bw horizon has hue of 2.5YR to 7.5YR, value of 4 to 6, and chroma of 3 to 8. Its texture in the fine earth fraction is loam or silt loam. Its reaction ranges from extremely acid to moderately acid.

The BC and C horizons have hue of 10YR to 7.5YR, value of 3 to 5, and chroma of 2 to 4. Their textures in the fine earth fraction are silt loam or loam. Reaction of the horizons ranges from extremely acid to moderately acid. In some pedons a few mottles are just above the bedrock.

Ossipee Series

The Ossipee series consists of very deep, very poorly drained soils in depressional areas in the Catskill Mountains. These soils formed in organic materials over a mineral substratum. The mean annual air temperature is less than 47 degrees. Slope is less than 2 percent.

Ossipee soils are commonly near Greenwood, Suny, and Onteora soils on upland till plains. Ossipee soils have a thinner layer of organic material than Greenwood soils. Ossipee soils are wetter than Onteora soils. Unlike Suny and Onteora soils, Ossipee soils have a thick organic layer.

Typical pedon of Ossipee muck, in the town of Neversink, 300 yards northeast of the intersection of Smith and Aden Hill Roads:

Oi—2 inches to 0; mat of sphagnum moss, and live and dead roots.

Oe1—0 to 11 inches; black (5YR 2/1) broken face and rubbed muck (sapric material); about 40 percent fiber, 15 percent rubbed; moderate coarse granular structure; very friable; common fine, medium and large roots; very strongly acid (pH 5.0 in water); abrupt wavy boundary.

Oe2—11 to 28 inches; dark reddish brown (5YR 3/2) broken face, dark reddish brown (5YR 2/2) rubbed mucky peat (hemic material); about 60 percent fiber, 40 percent rubbed; weak medium platy structure; friable; very strongly acid (pH 5.0 in water); abrupt wavy boundary.

Oe3—28 to 40 inches; dark brown (7.5YR 3/2) broken

face and rubbed mucky peat (hemic material); about 50 percent fiber, 20 percent rubbed; massive; friable; very strongly acid (pH 5.0 in water); abrupt smooth boundary.

2Cg—40 to 60 inches; gray (10YR 5/1) silt loam; massive; firm; 10 percent rock fragments; strongly acid.

The total thickness of the organic layers ranges from 16 to 50 inches. Depth to bedrock is more than 60 inches. Woody fragments make up as much as 15 percent, by volume, of the organic layers.

The surface tier has hue of 5YR, value of 1 to 3, and chroma of 1 or 2. It is dominantly hemic. Its reaction is extremely acid or very strongly acid.

The bottom tier has hue of 7.5YR, value of 3, and chroma of 2, or hue of 5YR, value of 1 to 3, and chroma of 1 or 2. It is dominantly hemic. Its reaction is extremely acid or very strongly acid.

The 2C horizon has hue of 10YR, value of 4 to 6, and chroma of 0 to 4. Its texture ranges from silt loam to sandy loam. Its reaction ranges from strongly acid to slightly acid. Rock fragment content ranges from 0 to 10 percent.

Otisville Series

The Otisville series consists of very deep, excessively drained soils on glacial outwash terraces, kames, and eskers. These soils formed in glacial outwash derived from sandstone, siltstone, and shale. Slope ranges from 0 to 50 percent.

Otisville soils are commonly near Riverhead, Chenango, and Valois soils. Pompton, Tunkhannock, and Red Hook soils are on nearby landscapes. Otisville soils are better drained than Red Hook and Pompton soils. They are sandier than Valois, Chenango, Tunkhannock, and Riverhead soils. Otisville soils are also more gravelly than Riverhead, Valois, Pompton, and Red Hook soils. They are less red in color than Tunkhannock soils.

Typical pedon of Otisville gravelly loamy coarse sand, 8 to 15 percent slopes, in the town of Mamakating, 670 feet southeast of the intersection of Campbell and Wintertown Roads, in a hayfield:

Ap—0 to 9 inches; dark brown (10YR 3/3) gravelly loamy coarse sand; weak medium subangular blocky structure parting to weak fine granular; very friable; many fine and few medium roots; 30 percent gravel; slightly acid; abrupt smooth boundary.

Bw1—9 to 15 inches; yellowish brown (10YR 5/6) very gravelly loamy coarse sand; single grain; loose; common fine and few medium roots; 35 percent gravel, 1 percent cobblestones; moderately acid; clear smooth boundary.

Bw2—15 to 33 inches; yellowish brown (10YR 5/6) extremely gravelly loamy coarse sand; single grain; loose; common fine roots; 65 percent gravel, 2 percent cobblestones; strongly acid; clear smooth boundary.

C—33 to 60 inches; brown (7.5YR 5/4) sand and gravel, weakly stratified; single grain; loose; few fine roots; 60 percent coarse fragments, 3 percent cobblestones; gravel and cobblestone content is variable; strongly acid.

The solum ranges from 14 to 36 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments range from 15 to 35 percent, by volume, in the A horizon, from 30 to 65 percent in the B horizon, and from 35 to 70 percent in the C horizon.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 4. Its texture in the fine earth fraction ranges from sandy loam to loamy coarse sand. Its reaction is slightly acid, but unlimed areas are extremely acid to strongly acid.

The B horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 8. Its texture in the fine earth fraction ranges from loamy fine sand to coarse sand. Its reaction is extremely acid to strongly acid, except in limed areas, it is moderately acid in the upper part.

The C horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 2 to 4. Its texture of the fine earth fraction ranges from loamy sand to coarse sand. Its reaction ranges from very strongly acid to moderately acid.

Palms Series

The Palms series consists of very deep, very poorly drained soils in depressions on lake plains, till plains, or moraines. These soils formed mainly in herbaceous material in bogs and marshy depressions over a substratum of glacial till or glacial outwash. Slope ranges from 0 to 2 percent.

Palms soils are near and formed in the same kind of parent material as Carlisle soils but have a thinner organic layer. They are also near Alden and Neversink soils and are slightly wetter than Neversink soils.

Typical pedon of Palms muck, in the town of Thompson, 50 feet south of Cantrell Road from a point 400 feet west of the intersection of Cantrell and Waschitz Roads:

Oa1—0 to 12 inches; black (10YR 2/1) broken face, very dark brown (10YR 2/2) rubbed, muck (sapric material); about 30 percent fiber unrubbed, about 5 percent rubbed; weak medium granular structure; slightly sticky; fibers are herbaceous, some live roots; strongly acid; clear smooth boundary.

Oa2—12 to 22 inches; black (10YR 2/1) broken face and rubbed, muck (sapric material); about 5 percent fiber, less than 5 percent rubbed; weak coarse subangular blocky structure; slightly sticky; fibers are herbaceous; about 25 to 30 percent mineral material; strongly acid; clear smooth boundary.

2C1—22 to 25 inches; grayish brown (10YR 5/2) fine sandy loam; massive; nonsticky; few fine roots; common fine pores; strongly acid; abrupt smooth boundary.

2C2—25 to 41 inches; gray (5Y 6/1) silt loam; massive; slightly sticky; few fine and medium roots; common fine and medium pores; less than 5 percent rock fragments; strongly acid; abrupt smooth boundary.

2C3—41 to 60 inches; red (2.5YR 4/6) loam; few medium distinct gray (10YR 6/1) mottles; massive; slightly sticky; 10 percent coarse fragments; strongly acid.

Depth to the loamy 2C horizon ranges from 16 to 50 inches. Fibers are mainly herbaceous, but some pedons have twigs, branches, or small logs. Depth to bedrock is 60 inches or more. Rock fragments range from 0 to 15 percent, by volume, in the 2C horizon.

The surface tier has hue of 10YR, value of 2, and chroma of 1 or 2. Its reaction ranges from strongly acid to slightly acid. Some pedons have variable amounts of hemic and sapric materials.

The subsurface tier is neutral or has hue of 10YR to 5YR, value of 2 or 3, and chroma of 0 to 3. Its reaction ranges from strongly acid to slightly acid. The tier is dominantly sapric material, but includes some hemic or fibric material.

The 2C horizon has hue of 10YR to 2.5YR, value of 4 to 6, and chroma of 1 to 6. Its texture in the fine earth fraction ranges from silt loam to fine sandy loam. Its reaction ranges from strongly acid to slightly acid.

Philo Series

The Philo series consists of very deep, moderately well drained soils that formed in recent alluvium derived from sandstone and shale. These soils are on flood plains. Slope ranges from 0 to 3 percent.

Philo soils formed in the same kind of parent material as and are near Pope soils but are wetter than Pope soils and have low chroma mottles within 24 inches of the surface. Well drained Chenango, Riverhead, and Otisville soils, which are more gravelly or sandier, are on terraces adjacent to Philo soils. Philo soils are also near Wayland and Suncook soils. They are better drained and do not have the very dark colored surface layer of Wayland soils, and are less sandy and wetter than Suncook soils. Philo soils are yellower in color than Barbour and Bash soils.

Typical pedon of Philo silt loam, along the Shawangunk Kill in the town of Mamakating, 0.25 mile northeast of the intersection of Roe and Burlingham Roads, about 300 feet south of Burlingham Road:

A—0 to 10 inches; dark brown (10YR 4/3) silt loam; moderate medium granular structure; friable; common fine and medium roots; strongly acid; clear wavy boundary.

E/B—10 to 12 inches; dark brown (10YR 4/3) and dark yellowish brown (10YR 4/4) silt loam; weak medium granular structure; friable; common fine and medium roots; strongly acid; clear wavy boundary.

Bw1—12 to 18 inches; yellowish brown (10YR 5/6) silt loam; weak medium subangular blocky structure; friable; common fine and medium roots; common fine pores; strongly acid; abrupt smooth boundary.

Bw2—18 to 24 inches; yellowish brown (10YR 5/4) silt loam; many medium distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; few fine roots; few fine pores; strongly acid; clear smooth boundary.

BC—24 to 38 inches; light brownish gray (10YR 6/2) silt loam; common medium prominent yellowish brown (10YR 5/8 and 5/4) mottles; moderate medium subangular blocky structure; firm; common fine and medium pores; strongly acid; clear smooth boundary.

C1—38 to 45 inches; light brownish gray (10YR 6/2) fine sandy loam; many coarse distinct yellowish brown (10YR 5/4) and strong brown (7.5YR 5/8) mottles; massive; friable; 5 percent gravel; moderately acid; abrupt smooth boundary.

2C2—45 to 60 inches; multicolored gray (10YR 6/1) and pale brown (10YR 6/3) loamy fine sand; massive; very friable; 5 percent gravel; moderately acid.

The solum ranges from 38 to 48 inches in thickness. Depth to low chroma mottles ranges from 12 to 24 inches. Depth to bedrock is more than 60 inches. Rock fragments range from 0 to 15 percent, by volume, in the solum and from 5 to 35 percent in the C horizon.

The A horizon has hue of 7.5YR and 10YR, value of 3 or 4, and chroma of 2 or 3. Its texture ranges from silt loam to sandy loam. Its reaction ranges from very strongly acid to moderately acid.

The B horizon has hue of 7.5YR and 10YR, value of 4 to 6, and chroma of 3 to 6. Its texture ranges from silt loam to sandy loam. Its reaction ranges from very strongly acid to moderately acid.

The C horizon is neutral or has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 0 to 2. Texture ranges from silt loam to sandy loam above the 2C horizon and from silt loam through sand or their gravelly analog, in the 2C horizon. Reaction ranges from very strongly acid to moderately acid.

Pompton Series

The Pompton series consists of very deep, moderately well drained to somewhat poorly drained soils that formed in glacial outwash derived from sandstone, conglomerate, and shale. These soils are in nearly level or gently sloping areas on outwash plains and terraces. Slope ranges from 0 to 8 percent.

Pompton soils are near and formed in parent material similar to that of Tunkhannock, Chenango, Riverhead, and Red Hook soils. Pompton soils are not as well drained as Riverhead, Tunkhannock, and Chenango soils but are better drained than Red Hook soils. Pompton soils are less gravelly than Chenango and Tunkhannock soils. They are also near the siltier Raynham and Scio soils.

Typical pedon of Pompton gravelly fine sandy loam, 3 to 8 percent slopes, in the town of Mamakating, 75 feet southeast of County Road 61, 0.2 mile southwest of New York Route 17, at the edge of a pit:

Ap—0 to 10 inches; brown (10YR 4/3) gravelly fine sandy loam; weak fine granular structure; soft; many roots; 20 percent gravel; strongly acid; abrupt smooth boundary.

Bw1—10 to 18 inches; yellowish brown (10YR 5/6) gravelly sandy loam; weak medium subangular blocky structure; friable; common fine roots; few fine and medium pores; 15 percent gravel; strongly acid; clear smooth boundary.

Bw2—18 to 22 inches; yellowish brown (10YR 5/4) gravelly sandy loam; few fine distinct light gray (10YR 7/2) mottles; weak medium subangular blocky structure; friable; common fine roots; few fine and medium pores; 15 percent gravel; strongly acid; clear wavy boundary.

Bw3—22 to 30 inches; strong brown (7.5YR 5/6) sandy loam; weak medium subangular blocky structure; friable; few fine roots; common fine and medium pores; 10 percent gravel; strongly acid; clear smooth boundary.

2C—30 to 60 inches; yellowish brown (10YR 5/4) gravelly sand; single grained; loose; 15 percent gravel; strongly acid.

The solum ranges from 24 to 36 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments range from 5 to 35 percent in the solum and from 15 to 70 percent in individual horizons in the C horizon.

The A horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. Its texture in the fine earth fraction ranges from sandy loam to silt loam. Its reaction is strongly acid or very strongly acid.

The B horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 4 to 6. It has low chroma mottles within a depth of 24 inches. Its texture in the fine earth fraction is fine sandy loam or sandy loam. Its reaction is strongly acid or very strongly acid.

The C horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 2 to 4. Its texture ranges from loamy sand to sand or their gravelly or cobbly analog. Its reaction is strongly acid or very strongly acid.

Pope Series

The Pope series consists of very deep, well drained soils that formed in recent alluvium derived from acid sandstone, siltstone, and shale. These soils are on level or nearly level flood plains. Slope range is 0 to 3 percent.

Pope soils formed in the same kind of parent material and are near Philo soils. They are better drained than Philo soils and do not have low chroma mottles above a depth of 24 inches. Sandier, or sandy and gravelly Riverhead, Chenango, and Otisville soils are in terrace positions adjacent to Pope soils. Pope soils are also near poorly drained and very poorly drained Wayland soils and the sandier, excessively drained Suncook soils. Pope soils are yellower than Barbour and Bash soils.

Typical pedon of Pope silt loam, occasionally flooded, in the town of Mamakating, in a wooded area along the Shawangunk Kill, ⅛ mile southeast of the intersection of Burlingham and Roosa Gap Roads, 50 feet northwest of Shawangunk Kill:

A—0 to 3 inches; very dark grayish brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry;

moderate fine granular structure; very friable; many fine and few medium and coarse roots; extremely acid; clear smooth boundary.

BA—3 to 11 inches; dark brown (10YR 4/3) loam; dark grayish brown (10YR 4/2) organic stains on ped faces; weak fine and medium subangular blocky structure; very friable; common fine and a few medium and coarse roots; few fine and medium tubular pores; extremely acid; clear smooth boundary.

Bw1—11 to 20 inches; yellowish brown (10YR 5/4) silt loam; moderate fine and medium subangular blocky structure; friable; few fine and medium roots; common fine and a few medium pores; very strongly acid; gradual wavy boundary.

Bw2—20 to 32 inches; dark brown (7.5YR 4/4) silt loam; moderate fine and medium subangular blocky structure; friable; few fine and medium roots; common fine and few medium pores; very strongly acid; abrupt smooth boundary.

C—32 to 60 inches; brown (10YR 5/3 and 4/3) fine sandy loam; common fine and medium distinct pale brown (10YR 6/3) mottles, few fine distinct dark brown (7.5YR 4/4) mottles; massive; friable; few fine roots; many tubular and vesicular pores; very strongly acid.

The solum ranges from 30 to 50 inches in thickness. Depth to bedrock is more than 60 inches. Gravel content ranges from 0 to 15 percent, by volume, in the solum and from 0 to 40 percent in the C horizon.

The A horizon has hue of 10YR, value of 3 to 5, and chroma of 2 to 4. Its texture in the fine earth fraction ranges from sandy loam to silt loam. Its reaction ranges from strongly acid to extremely acid.

The B horizon has hue of 10YR and 7.5YR, value of 4 to 6, and chroma of 3 to 6. In some pedons it has mottles below a depth of 24 inches. Its texture in the fine earth fraction ranges from sandy loam to silt loam. Its reaction ranges from strongly acid to extremely acid.

The C horizon has colors similar to those of the B horizon. Its texture ranges from loamy sand to fine sandy loam. Its reaction ranges from strongly acid to extremely acid.

Raynham Series

The Raynham series consists of very deep, somewhat poorly drained or poorly drained soils on old glacial stream terraces and in upland basins that were occupied by glacial lakes. These soils formed in water-laid deposits of coarse silts and fine sands, derived from siltstone and sandstone. Slope ranges from 0 to 3 percent.

Raynham soils are commonly near and formed in the same kind of parent material as Scio and Wallington soils. Raynham soils are wetter than Scio soils. Unlike Raynham soils, Wallington soils have a dense, slowly permeable fragipan. Raynham soils are not as gravelly as and are near Red Hook soils. They are better drained than Wayland soils, which are adjacent to streams.

Typical pedon of Raynham silt loam, in the town of Mamakating, 100 feet southeast of County Route 62, on farmland:

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam; many medium distinct dark reddish brown (5YR 3/3) root stains; weak medium and fine granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

E—8 to 12 inches; pale brown (10YR 6/3) silt loam; common medium faint light yellowish brown (10YR 6/4) and common fine distinct reddish brown (5YR 4/4) mottles; weak medium granular structure; friable; common fine roots; common large and many medium pores; slightly acid; abrupt smooth boundary.

Bw—12 to 16 inches; brown (7.5YR 5/4) ped interiors, pale brown (10YR 6/3) ped faces; silt loam; common medium distinct dark reddish brown (5YR 3/4) mottles; weak medium platy structure; friable; few fine roots; few large and many fine pores; slightly acid; clear wavy boundary.

Bg—16 to 30 inches; brown (7.5YR 5/2) silt loam; many medium distinct dark reddish brown (5YR 3/2) and reddish brown (5YR 4/4) mottles; moderate medium platy structure; firm; few fine roots; few large and common fine pores; slightly acid; gradual wavy boundary.

C—30 to 62 inches; yellowish brown (10YR 5/4) silt loam; many vertical streaks of light gray (10YR 7/1) surrounding brownish yellow (10YR 6/8) bodies; weak thick platy structure; firm; few black (10YR 2/1) manganese stains; moderately acid.

The solum ranges from 16 to 37 inches in thickness. Depth to bedrock is more than 60 inches. Most pedons do not have rock fragments, but some pedons have as much as 2 percent, by volume. Some pedons also have thin, sandy layers.

The Ap horizon has hue of 2.5Y or 10YR, value of 2 to 4, and chroma of 1 to 3. Its texture is silt loam. Its reaction ranges from strongly acid to neutral.

The E horizon has hue of 2.5Y or 10YR, value of 5 or 6, and chroma of 3 or 4. Its texture ranges from silt loam to very fine sandy loam. Its reaction ranges from strongly acid to neutral.

The B horizon has hue of 2.5Y to 7.5YR, value of 4 or 5, and chroma of 2 to 4. Its texture is silt, silt loam, or very fine sandy loam. Its consistence is friable or firm. Its reaction ranges from strongly acid to neutral.

The C horizon has hue of 2.5Y to 7.5YR, value of 4 to 6, and chroma of 1 to 4. Its texture ranges from silt loam to very fine sandy loam. Its structure is platy or massive. Its consistence is friable or firm. Its reaction ranges from moderately acid to mildly alkaline.

Red Hook Series

The Red Hook series consists of very deep, somewhat poorly drained soils in low-lying positions on glacial outwash plains, fans, and old stream terraces. These soils formed in glacial outwash derived from sandstone, siltstone, and shale. Slope ranges from 0 to 3 percent.

Red Hook soils are commonly near Pompton, Scio, and Raynham soils, and, on higher parts of the landscape, are near Otisville, Chenango, Tunkhannock, and Riverhead soils. Red Hook soils have more coarse fragments than Raynham soils and are wetter than these other soils.

Typical pedon of Red Hook sandy loam, in the town of Mamakating, 50 feet northeast of Campbell Road, 750 feet southeast of the intersection of Campbell and Winterton Roads, in pasture:

Ap—0 to 7 inches; dark brown (10YR 3/3) sandy loam; common fine distinct brown (7.5YR 4/4) root stains; moderate medium granular structure; friable; many fine and few medium roots; 5 percent gravel; extremely acid; abrupt smooth boundary.

Bw—7 to 15 inches; yellowish brown (10YR 5/4) fine sandy loam; light brownish gray (2.5Y 6/2) ped faces; few medium distinct strong brown (7.5YR 5/8) mottles and common medium distinct light brownish gray (2.5Y 6/2) mottles; weak fine and medium subangular blocky structure; friable; many fine roots; common fine tubular pores, few large tubular pores filled with organic matter; 10 percent gravel; very strongly acid; clear smooth boundary.

Bg—15 to 38 inches; gray (10YR 6/1) loam; gray (10YR 5/1) ped faces; many (35 percent) medium distinct brown (7.5YR 5/4) and yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; few fine roots; few fine tubular and vesicular pores; some patchy clay linings; 10 percent gravel; very strongly acid; clear wavy boundary.

2C—38 to 60 inches; grayish brown (10YR 5/2) very gravelly coarse sandy loam; few coarse prominent strong brown (7.5YR 5/6) and brown (7.5YR 5/4) mottles; massive; firm; few fine vesicular pores; some clay bridging; 48 percent gravel; strongly acid.

The solum ranges from 20 to 40 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments range from 5 to 15 percent, by volume, in the A horizon, from 10 to 50 percent in the B horizon, and from 20 to 65 percent in the C horizon. Average rock content throughout is less than 35 percent.

The Ap horizon has hue of 10YR or 2.5Y, value of 2 to 4, and chroma of 2 or 3. Its texture ranges from sandy loam to silt loam or their gravelly analog. Its reaction ranges from extremely acid to moderately acid.

The B horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 to 4. Its texture ranges from sandy loam to silt loam or their gravelly or very gravelly analog. Its reaction is strongly acid or very strongly acid.

The C horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 1 to 3. Its texture ranges from gravelly or very gravelly sandy loam to gravelly or very gravelly silt loam. Its reaction is moderately acid to very strongly acid.

Red Hook soils in this survey area are a taxadjunct to the Red Hook series because their reaction is more acid in the solum and the substratum than defined in the range for the series. This difference does not significantly affect use and management of the soils.

Riverhead Series

The Riverhead series consists of very deep, well drained soils on outwash plains, valley trains, kames, and parts of moraines. These soils formed in glacial outwash and morainic deposits derived from sandstone, siltstone, and shale. Slope ranges from 0 to 15 percent.

Riverhead soils formed in parent material similar to those of Otisville, Chenango, Tunkhannock, and Pompton soils. Riverhead soils are better drained than Pompton soils. Riverhead soils are less gravelly than Chenango, Tunkhannock, and Otisville soils.

Typical pedon of Riverhead sandy loam, 8 to 15 percent slopes, in the town of Mamakating, along Burlingham Road, 50 feet south of the intersection of Burlingham and Rouis Road, in a roadbank:

Ap—0 to 6 inches; brown (10YR 4/3) sandy loam; weak medium granular structure; friable; many fine roots; 10 percent gravel; strongly acid; abrupt smooth boundary.

Bw1—6 to 20 inches; yellowish brown (10YR 5/6) sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; 10 percent gravel; strongly acid; clear wavy boundary.

Bw2—20 to 30 inches; yellowish brown (10YR 5/6) gravelly sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; 20 percent gravel; strongly acid; clear wavy boundary.

2C—30 to 60 inches; yellowish brown (10YR 5/6) gravelly loamy sand; single grained; loose; few medium roots; 35 percent gravel; strongly acid.

The solum ranges from 22 to 36 inches in thickness. Depth to bedrock is more than 60 inches. Gravel content ranges from 2 to 35 percent in the textured control section.

The A horizon has hue of 10YR, value of 2 to 4, and chroma of 1 to 3. Its texture in the fine earth fraction is sandy loam or loam. Its reaction is extremely acid to moderately acid.

The B horizon has hue of 2.5Y to 7.5YR, and value and chroma of 4 to 6. Its texture is sandy loam or fine sandy loam in the fine earth fraction, and more than 50 percent is fine sands or coarser. Its consistence is friable or very friable. Its reaction is extremely acid to moderately acid.

The C horizon has hue of 2.5Y or 10YR, value of 4 to 7, and chroma of 3 to 6. It is sand and gravel to fine sandy loam. Its consistence is loose. Its reaction is very strongly acid to moderately acid.

Scio Series

The Scio series consists of very deep, moderately well drained soils that formed in wind- or water-deposited silts and very fine sand. These soils are on terraces, on old alluvial fans, and in upland depressions. Slope ranges from 2 to 6 percent.

Scio soils formed in parent material similar to that of well drained Unadilla soils and somewhat poorly drained Raynham soils. Scio soils have more silt and less coarse sand and gravel than Pompton and Red Hook soils, which are in some adjacent areas of glacial outwash deposits. Pope, Philo, and Bash soils are on nearby flood plains.

Typical pedon of Scio silt loam, 2 to 6 percent slopes, in the town of Mamakating, 3/8 mile south of Bloomingburg along Winterton Road, 35 feet west of utility pole no. 17, in a cornfield:

Ap—0 to 6 inches; dark brown (10YR 3/3) silt loam; weak medium subangular blocky structure parting to fine granular; friable; common fine roots; 1 percent rock fragments; neutral (limed); abrupt smooth boundary.

Bw1—6 to 18 inches; yellowish brown (10YR 5/4) silt loam; common fine and medium faint pale brown (10YR 6/3) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine roots; common fine and few medium tubular pores; 1 percent rock fragments; slightly acid (limed); abrupt smooth boundary.

Bw2—18 to 29 inches; brown (10YR 4/3) to dark yellowish brown (10YR 4/4) silt loam; common medium distinct strong brown (7.5YR 5/6) mottles, light brownish gray (10YR 6/2) mottles, and light olive brown (2.5Y 5/4) mottles; moderate coarse prismatic structure parting to weak coarse subangular blocky; firm; few fine tubular pores; 2 percent rock fragments; strongly acid; clear wavy boundary.

C1—29 to 56 inches; brown (10YR 5/3) silt loam; common fine and medium distinct light brownish gray (10YR 6/2) mottles; massive; firm; common fine tubular pores; 1 percent rock fragments; moderately acid; gradual wavy boundary.

C2—56 to 68 inches; dark yellowish brown (10YR 4/4) silt loam; common medium distinct light brownish gray (10YR 6/2) mottles; massive; friable; slightly acid.

The solum ranges from 20 to 36 inches in thickness. If the soils have not been limed, they are very strongly acid to moderately acid in the A and B horizons and strongly acid to neutral in the C horizon. Depth to free carbonates and bedrock is more than 60 inches. Rock fragments range from 0 to 5 percent above a depth of 40 inches and to as much as 60 percent below that depth. Some pedons have a 2C horizon below a depth of 40 inches that has a high content of sand and gravel.

The Ap horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 or 3. Its texture is silt loam or very fine sandy loam. If the soils have not been limed, reaction is moderately acid to very strongly acid.

The B horizon has hue of 7.5YR to 5Y, value of 4 or 5, and chroma of 3 to 6. It is mottled with chroma of 1 or more. Its texture is silt loam or very fine sandy loam. If the soils have not been limed, reaction is moderately acid to very strongly acid.

The C horizon has hue of 7.5YR to 5Y, value of 4 to 6, and chroma of 1 to 4. It is silt loam to stratified gravel and sand. Its reaction ranges from strongly acid to neutral.

Scriba Series

The Scriba series consists of very deep, somewhat poorly drained soils that formed in glacial till derived from sandstone, siltstone, and shale. These soils are on glacial till plains and on the lower parts of hills on uplands. Slope ranges from 0 to 8 percent.

Scriba soils formed in the same kind of parent material as and are near Wurtsboro and Swartswood soils but are wetter and have gray mottles above the fragipan. Scriba soils are also near Neversink, Wellsboro, and Morris soils. Scriba soils have a fragipan and are better drained than Neversink soils, which do not have a fragipan. They are sandier and browner than Wellsboro and Morris soils.

Typical pedon of Scriba loam, 0 to 3 percent slopes, stony, in the town of Mamakating, in a wooded area 0.5 mile south of the intersection of Pine Kill Road and Yankee Lake Roads, 50 feet east of Pine Kill Road:

Oi—2 inches to 0; partly decomposed leaves and twigs; very friable; very strongly acid.

A—0 to 6 inches; very dark gray (10YR 3/1) loam; moderate medium granular structure; friable; many fine and common medium roots; 10 percent rock fragments; extremely acid; clear smooth boundary.

E—6 to 12 inches; dark gray (10YR 4/1) channery very fine sandy loam; few medium faint light brownish gray (10YR 6/2) mottles; moderate medium granular structure; friable; common fine and few medium roots; 15 percent rock fragments; extremely acid; clear wavy boundary.

Bw—12 to 18 inches; brown (10YR 5/3) channery loam; common medium distinct brownish yellow (10YR 6/6) mottles; weak coarse subangular blocky structure; friable; few fine and medium roots; 20 percent rock fragments; very strongly acid; abrupt wavy boundary.

Bx—18 to 60 inches; yellowish brown (10YR 5/4) channery loam; common medium distinct strong brown (7.5YR 5/6) and brown (7.5YR 5/2) mottles; massive within very coarse prisms; prisms separated by wedge-shaped streaks of loam with gray (N 6/0) interiors and yellowish brown (10YR 5/8) borders; very firm and brittle; common medium pores; 30 percent rock fragments; strongly acid.

The solum ranges from 34 to 72 inches in thickness. Depth to the fragipan ranges from 12 to 18 inches. Depth to bedrock is more than 60 inches. Rock fragments range from 10 to 35 percent, by volume, above the fragipan and from 20 to 60 percent in the fragipan and in the C horizon.

The A horizon has hue of 2.5Y to 7.5YR, value of 2 or 3, and chroma of 1 or 2. Its texture in the fine earth fraction ranges from silt loam to fine sandy loam. Its reaction ranges from extremely acid to slightly acid.

The E horizon has hue of 7.5YR to 2.5Y, value of 4 to 6, and chroma of 1 or 2. Its texture in the fine earth fraction ranges from sandy loam to silt loam. Its reaction ranges from extremely acid to slightly acid.

The Bw horizon has hue of 2.5Y to 7.5YR, value of 4 or 5, and chroma of 3 to 6. Its texture is similar to that of the E horizon. Its reaction ranges from extremely acid to slightly acid.

The Bx horizon is neutral or has hue of 5YR to 2.5Y, value of 3 to 6, and chroma of 0 to 4. Its texture in the fine earth fraction ranges from sandy loam to silt loam. Its reaction ranges from strongly acid to slightly acid.

Some pedons have a C horizon that has colors and texture that are similar to those of the fragipan. Reaction of the C horizon ranges from strongly acid to slightly acid.

Suncook Series

The Suncook series consists of very deep, excessively drained soils on flood plains and in areas adjacent to major streams and rivers. These soils formed in recent, sandy alluvial deposits that derived from sandstone, siltstone, and shale. Slope ranges from 0 to 2 percent.

Suncook soils are commonly near Barbour, Pope, Philo, and Bash soils. Suncook soils have more sand than Pope, Philo, Barbour, and Bash soils. Also, Suncook soils are better drained than Philo and Bash soils. They have less gravel than Barbour soils and the nearby Chenango and Tunkhannock soils.

Typical pedon of Suncook fine sandy loam, in the town of Fallsburg, 1/10 mile north of the intersection of Lippman Road and Hasbrouck "A" Road, 1/4 mile southeast on dirt road along the Neversink River, in an idle field:

Ap—0 to 8 inches; dark reddish gray (5YR 4/2) fine sandy loam; weak medium subangular blocky structure parting to fine granular; friable; common fine and few medium roots; very strongly acid; abrupt smooth boundary.

C1—8 to 14 inches; dark reddish brown (5YR 3/3) loamy sand; weak medium and fine subangular blocky structure; friable; common fine and very fine roots; many irregular pores; very strongly acid; clear smooth boundary.

C2—14 to 35 inches; dark reddish brown (5YR 3/4) loamy sand; massive; very friable; few fine roots; many fine pores; 2 percent gravel; very strongly acid; clear smooth boundary.

C3—35 to 44 inches; dark reddish brown (5YR 3/4) loamy sand; massive; friable; few fine and medium roots; many fine pores; very strongly acid; clear wavy boundary.

2C4—44 to 60 inches; dark brown (7.5YR 4/2) extremely gravelly loamy coarse sand; single grain; loose; 60 percent gravel; very strongly acid.

Gravel content ranges from 0 to 10 percent to a depth of 20 inches, from 0 to 20 percent between depths of 20 to 40 inches, and from 20 to 60 percent below a depth of 40 inches.

The Ap or A horizon has hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 or 3. Its texture ranges from loamy fine sand to fine sandy loam. Its reaction ranges from very strongly acid to slightly acid.

The C horizon has hue of 5YR to 2.5Y, value of 3 to 6, and chroma of 1 to 4. Its texture in the fine earth fraction ranges from loamy fine sand to sand and coarse sand. Its reaction ranges from very strongly acid to slightly acid.

Suny Series

The Suny series consists of very deep, poorly drained to very poorly drained soils that formed in acid, glacial till derived from sandstone, siltstone, and shale. These soils are nearly level and are on level or slightly depressed parts of glaciated uplands. Slope ranges from 0 to 3 percent. The mean annual temperature is less than 47 degrees.

Suny soils formed in the same kind of parent material as Lewbeach, Willowemoc, and Onteora soils. Suny soils are wetter and do not have a fragipan. Suny soils are also near very poorly drained, organic Greenwood and Ossipee soils.

Typical pedon of Suny fine sandy loam, in the town of Neversink, 650 feet northwest of the intersection of Smith and Aden Hill Roads, in a wooded area:

Oi—2 inches to 1 inch; slightly decomposed organic litter.

Oe—1 inch to 0; black (5YR 2/1) hemic material; fine and medium granular structure; very friable; many fine roots, common medium and large roots; very strongly acid; abrupt smooth boundary.

A—0 to 2 inches; dark reddish brown (5YR 2/2) fine sandy loam; weak medium subangular blocky structure parting to fine granular; friable; common fine and medium roots; 5 percent rock fragments; very strongly acid; abrupt wavy boundary.

E—2 to 4 inches; grayish brown (10YR 5/2) sandy loam; weak medium subangular blocky structure; friable; few fine roots; 5 percent rock fragments; very strongly acid; abrupt wavy boundary (0 to 5 inches thick).

Bw1—4 to 8 inches; light brownish gray (10YR 6/2) sandy loam; common coarse distinct yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; firm; few fine tubular pores; common fine vesicular pores; 10 percent rock fragments; strongly acid; clear wavy boundary.

Bw2—8 to 17 inches; brown (7.5YR 5/2) gravelly sandy loam; common medium distinct yellowish brown (10YR 5/6) mottles; massive; firm; few medium tubular pores; common fine vesicular pores; 15 percent rock fragments; strongly acid; clear wavy boundary.

C—17 to 60 inches; reddish brown (5YR 5/3) gravelly sandy loam; few medium distinct yellowish red (5YR 5/6) mottles; massive; firm; common fine and few medium vesicular pores; 20 percent rock fragments; strongly acid.

The solum ranges from 15 to 30 inches in thickness. Rock fragment content ranges from 5 to 35 percent in the A and B horizons and from 20 to 40 percent in the C horizon. Depth to bedrock is more than 60 inches.

The A horizon has hue of 10YR to 5YR, value of 1 to 3, and chroma of 1 or 2. Its texture in the fine earth fraction ranges from silt loam to sandy loam. Its reaction ranges from extremely acid to strongly acid.

The E horizon has hue of 10YR or 7.5YR, value of 3 to 6, and chroma of 1 or 2. Its texture in the fine earth fraction ranges from loam to sandy loam. Its reaction ranges from extremely acid to strongly acid. Some pedons do not have an E horizon.

The B horizon has hue of 10YR to 5YR, value of 3 to 6, and chroma of 1 to 4. Its texture in the fine earth fraction ranges from silt loam to sandy loam. Its reaction ranges from extremely acid to strongly acid. Its consistence is friable or firm.

The C horizon has hue of 7.5YR to 5YR, value of 4 or 5, and chroma of 3 or 4. Its texture in the fine earth fraction ranges from silt loam to sandy loam. Its consistence is friable or firm, or the horizon is massive.

Its reaction ranges from extremely acid to strongly acid.

Swartswood Series

The Swartswood series consists of very deep, well drained soils that formed in glacial till derived mainly from sandstone and conglomerate and, in some areas, partly from lesser amounts of shale. These soils are on the tops and sides of hills on glaciated uplands. Slope ranges from 3 to 50 percent.

Swartswood soils formed in parent material similar to that of Wurtsboro and Scriba soils. Swartswood soils are better drained than Wurtsboro and Scriba soils and are higher on the landscape. Swartswood soils, in some parts of the survey area, are near Lordstown, Valois, Cheshire, Lackawanna, and Wellsboro soils. Swartswood soils are deeper to bedrock than Lordstown soils. Unlike Valois and Cheshire soils, they have a firm, dense layer called a fragipan. They are also sandier than Lackawanna and Wellsboro soils.

Typical pedon of Swartswood gravelly loam, 8 to 15 percent slopes, stony, in the town of Lumberland, 800 feet west of the intersection of Proctor and Mohaph Roads and 40 feet south of Proctor Road, in woodland:

Oi—2 inches to 0; black (5YR 2/1) partly decomposed leaf litter; abrupt smooth boundary.

A—0 to 1 inch; dark reddish brown (5YR 2/2) gravelly loam; moderate medium and fine granular structure; very friable; many fine, common medium and few coarse roots; 25 percent gravel; extremely acid; clear smooth boundary.

BA—1 to 3 inches; dark brown (7.5YR 4/4) loam; weak medium subangular blocky structure parting to fine and medium granular; very friable; many fine, common medium, and few coarse roots; many fine vesicular pores; 10 percent rock fragments; very strongly acid; clear smooth boundary.

Bw1—3 to 10 inches; dark brown (7.5YR 4/4) loam; weak fine and medium subangular blocky structure; very friable; many fine, common medium, and few coarse roots; common fine tubular and many fine vesicular pores; 10 percent rock fragments; very strongly acid; gradual wavy boundary.

Bw2—10 to 22 inches; reddish brown (5YR 5/3) gravelly sandy loam with few reddish brown (5YR 4/4) streaks; weak medium and coarse subangular blocky structure; friable; common fine and few medium roots; common fine tubular and many fine vesicular pores; 20 percent rock fragments; very strongly acid; clear wavy boundary.

E—22 to 26 inches; reddish brown (5YR 5/3) and light reddish brown (5YR 6/3) gravelly loam; common medium distinct yellowish red (5YR 5/6) mottles and few fine faint reddish gray (5YR 5/2) mottles; weak fine and medium subangular blocky structure; friable; few fine and few medium roots; many fine vesicular and few tubular pores; 25 percent rock fragments; very strongly acid; abrupt wavy boundary.

Bx—26 to 60 inches; reddish brown (5YR 4/3) gravelly sandy loam with pockets of brown (7.5YR 5/2) loamy fine sand; common medium distinct yellowish red (5YR 4/6) mottles; massive; widely separated streaks with reddish gray (5YR 5/2) interiors and yellowish red (5YR 5/6) exteriors; firm, brittle; few fine roots; common fine vesicular pores; thin clay linings in some pores, also coatings on some pebbles; 30 percent rock fragments; very strongly acid.

The solum ranges from 40 to 70 inches in thickness. Depth to the fragipan ranges from 20 to 36 inches. Depth to bedrock is more than 60 inches. Rock fragments range from 3 to 40 percent, by volume, above the fragipan and from 15 to 60 percent in the Bx and C horizons. If the soils have not been limed, reaction ranges from strongly acid to extremely acid throughout.

The Ap or A horizon has hue of 5YR to 10YR, value of 2 to 5, and chroma of 1 to 3. Its texture in the fine earth fraction ranges from loam to sandy loam.

The Bw horizon has hue of 5YR, 7.5YR, and 10YR, value of 4 to 6, and chroma of 3 to 6. In some pedons it has mottles below a depth of 26 inches. Its texture in the fine earth fraction ranges from sandy loam to loam.

The Bx horizon has hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 6. In some pedons it has mottles that have low or high chroma. Its texture in the fine earth fraction ranges from sandy loam to loam. Its structure is platy and blocky, or the horizon is massive.

Torull Series

The Torull series consists of shallow, somewhat poorly drained or poorly drained soils on bedrock-controlled uplands in the area of the Catskill Mountains. These soils formed in glacial till derived mainly from sandstone, siltstone, and shale. Slope ranges from 1 to 5 percent.

Torull soils formed in parent material similar to that of Hawksnest and Mongaup soils. Torull soils are shallower than Mongaup soils. They are also near very deep, somewhat poorly drained Onteora soils and

poorly drained or very poorly drained Suny soils.

Typical pedon of Torull silt loam, in an area of Torull-Rock outcrop complex, 1 to 5 percent slopes, in the town of Liberty, 1,500 feet south of Revonah Lake, 500 feet west of the access road to Revonah Lake, in a wooded area:

Oi—3 to 2 inches; mostly undecomposed leaves and twigs.

Oe—2 inches to 0; black (5YR 2/1) mostly hemic material; moderate medium granular structure; very friable; many fine and common medium roots; very strongly acid; abrupt smooth boundary.

A—0 to 1 inch; very dark gray (5YR 3/1) silt loam; weak coarse granular structure; friable; common fine and medium roots; common medium vesicular pores; about 5 percent rock fragments; very strongly acid; abrupt smooth boundary.

E—1 to 7 inches; gray (5YR 5/1) sandy loam; weak medium and coarse subangular blocky structure; friable; few fine roots; few fine and medium vesicular pores; few large tubular pores, some filling of pores with material from the A horizon; about 5 percent rock fragments; very strongly acid; clear wavy boundary.

Bg—7 to 16 inches; brown (7.5YR 5/2) fine sandy loam; many medium distinct strong brown (7.5YR 5/6) and reddish brown (5YR 5/3) mottles; weak coarse subangular blocky structure; friable; few fine vesicular and common fine and medium tubular pores; about 5 percent rock fragments; very strongly acid.

R—16 inches; hard, grayish brown sandstone bedrock.

The solum ranges from 10 to 16 inches in thickness. Depth to bedrock ranges from 10 to 20 inches. Rock fragments range from 0 to 15 percent throughout.

The A horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 1 to 3. Its texture is silt loam or loam. Its reaction is very strongly acid or strongly acid.

The E horizon has hue of 5YR to 10YR, value of 5 or 6, and chroma of 1 or 2. Its texture is fine sandy loam or sandy loam. Its reaction is very strongly acid or strongly acid. Some pedons do not have an E horizon.

The B horizon has hue of 5YR to 7.5YR, value of 4 to 6, and chroma of 2 or 3. It is mottled. Its texture is sandy loam or fine sandy loam. Its reaction is very strongly acid to strongly acid.

Some pedons have a thin C horizon that has the same colors and textures as those of the B horizon.

Tuller Series

The Tuller series consists of shallow, somewhat poorly drained or poorly drained soils. These soils formed in a thin layer of glacial till derived from acid sandstone, siltstone, and shale. They are nearly level to gently sloping and in bedrock-controlled areas or foot slopes bordered by bedrock faces. Slope ranges from 1 to 5 percent.

Tuller soils formed in parent material similar to that of Arnot, Oquaga, and Lordstown soils. Tuller soils are wetter than these other soils. They are shallower and have grayer colors than Oquaga soils. They are commonly near very deep, poorly drained Neversink soils.

Typical pedon of Tuller very fine sandy loam, in an area of Tuller-Rock outcrop complex, 1 to 5 percent slopes, in the town of Thompson, 2/3 mile east of County Road 161 along River Road, 25 feet south of River Road, in a wooded area:

Oi—1 inch to 0; black (5YR 2.5/1) partly decomposed leaves and twigs.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) very fine sandy loam; weak fine granular structure; friable; many fine and common medium roots; 5 percent rock fragments; very strongly acid; clear wavy boundary.

Bg—4 to 11 inches; gray (10YR 6/1) flaggy fine sandy loam; common coarse faint pale brown (10YR 6/3) mottles; weak coarse subangular blocky structure; firm; common fine roots; 15 percent rock fragments; very strongly acid; abrupt smooth boundary.

R—11 inches; hard, gray sandstone bedrock.

The solum and depth to bedrock range from 10 to 20 inches in thickness. Rock fragments, dominantly shale or sandstone, range from 5 to 15 percent, by volume, in the A horizon and from 10 to 35 percent in the B horizon.

The A horizon has hue of 7.5YR to 2.5Y, value of 3 to 5, and chroma of 2 or 3. Its texture ranges from silt loam to fine sandy loam or their gravelly or channery analog. Its reaction ranges from moderately acid to extremely acid. Some pedons have a thin E horizon.

The B horizon has hue of 5YR to 5Y, value of 4 to 6, and chroma of 1 to 3. Its texture ranges from silt loam to fine sandy loam or their gravelly, channery, or flaggy analog. Its consistence is friable or firm. Its reaction is strongly acid or very strongly acid.

Some pedons have a C horizon that is thin, mottled, gray, and slightly coarser.

Tunkhannock Series

The Tunkhannock series consists of very deep, well drained to somewhat excessively drained soils that formed in glacial outwash derived from sandstone, siltstone, and shale. These soils are on terraces, kames, and valley trains. Slope ranges from 0 to 50 percent.

Tunkhannock soils formed in parent material similar to that of Riverhead, Otisville, Chenango, and Pompton soils. They are also near Suncook and Barbour soils. Tunkhannock soils are more gravelly than Riverhead and Barbour soils, less sandy than Otisville and Suncook soils, and more gravelly and better drained than Pompton soils. Tunkhannock soils are redder in color than Chenango, Riverhead, Otisville, Suncook, and Pompton soils.

Typical pedon of Tunkhannock gravelly loam, 8 to 15 percent slopes, in the town of Bethel, 0.25 mile southwest of Kortwright Road, at the edge of the Mongaup River, in a gravel pit:

Ap—0 to 6 inches; dark reddish gray (5YR 4/2) gravelly loam; weak fine granular structure; friable; many fine and medium roots; 25 percent gravel; strongly acid; abrupt smooth boundary.

Bw1—6 to 20 inches; brown (7.5YR 4/4) very gravelly sandy loam; very weak fine granular structure; very friable; many fine and medium roots; 40 percent gravel; moderately acid; clear smooth boundary.

Bw2—20 to 38 inches; reddish brown (5YR 4/4) very gravelly very fine sandy loam; weak fine granular structure; very friable; common fine and medium roots; 35 percent gravel; strongly acid; clear smooth boundary.

C—38 to 60 inches; reddish brown (5YR 4/4 and 4/3) sands and gravel; single grain, loose; 50 percent gravel; strongly acid.

The solum ranges from 24 to 40 inches in thickness. Depth to bedrock is 60 inches or more. Rock fragments range from 20 to 35 percent, by volume, in the A horizon, from 15 to 60 percent in individual horizons of the B horizon, and from 40 to 65 percent in the C horizon.

The A horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 2 or 3. Its texture in the fine earth fraction ranges from silt loam to sandy loam. Its reaction ranges from extremely acid to moderately acid.

The B horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 3 to 6. Its texture in the fine earth fraction ranges from silt loam to sandy loam. Its reaction ranges from extremely acid to moderately acid.

The C horizon has hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 3 or 4. Its texture is sand, loamy sand, or sandy loam in the fine earth fraction. Its reaction ranges from extremely acid to moderately acid.

Udifluvents

Udifluvents consist of very deep, excessively drained to moderately well drained soils that formed in recent alluvial deposits. These soils have little or no profile development. They are in nearly level to gently sloping areas along streams, and are subject to frequent flooding.

Udifluvents have been mapped in a complex with Fluvaquents and are near Pope, Philo, Wayland, Barbour, Bash, and Suncook soils. Stream overflow and the accompanying scouring and cutting commonly shift the soil deposits from place to place.

These soils have been named above the series level in the soil classification system because soil properties differ greatly within a small area. For the same reason a typical pedon is not given.

The solum consists mainly of an A horizon 1 to 7 inches thick. Depth to bedrock is generally more than 5 feet. Content of rock fragments, including gravel, cobblestones, and flagstones, ranges from 0 to 80 percent, by volume.

The A horizon has hue of 10YR to 5YR, value of 2 to 6, and chroma of 0 to 4. Its texture in the fine earth fraction ranges from loam to sand. Its reaction is slightly acid to very strongly acid.

The C horizon has hue of 10YR to 5YR, value of 3 to 6, and chroma of 4 to 8. Its texture in the fine earth fraction is sandy loam or loam and in some pedons strata of loamy sand or sand. Its reaction is slightly acid to very strongly acid.

Udorthents

Udorthents consist of very deep, excessively drained to moderately well drained soils or disturbed soil material. Areas of these soils are nearly level to strongly sloping. Slope ranges from 0 to 15 percent.

Udorthents are mostly in small landfills, in borrow pits, or in construction sites throughout the county. Former soil horizons have been either buried, removed, or truncated; thus, there is no diagnostic horizon for other soil orders.

These soils have been classified above the series level in the soil classification system because of variability in the soil material and too few soil features to make a more detailed classification. For these reasons a typical pedon of Udorthents has not been given.

Udorthents have textures of silt loam to sand. Rock fragments throughout range from 0 to 80 percent, by volume. Depth to bedrock is commonly more than 60 inches.

The surface layer and the substratum have hue of 2.5Y to 2.5YR, value of 3 to 6, and chroma of 2 to 8. Their reaction is slightly acid to very strongly acid. Their consistence and their structure are variable.

Unadilla Series

The Unadilla series consists of very deep, well drained soils in terrace-like positions in valleys and on undulating to rolling lake plains. These soils formed in water- or wind-deposited material. Slope ranges from 0 to 6 percent.

Unadilla soils are near and formed in the same kind of parent material as moderately well drained Scio soils and somewhat poorly drained or poorly drained Raynham soils. Unadilla soils are also near Pope, Riverhead, Suncook, and Barbour soils. Unadilla soils are finer textured than Suncook and Riverhead soils. Unadilla soils are on slightly higher parts of the landscape than Pope, Barbour, and Suncook soils and are not subject to flooding.

Typical pedon of Unadilla silt loam, 2 to 6 percent slopes, in the town of Mamakating, 50 feet north of Meyerson Road and 0.3 mile west of old U.S. Route 209, in an idle area:

A—0 to 5 inches; dark brown (10YR 3/3) silt loam; moderate fine granular structure; friable; many fine roots; 5 percent gravel; strongly acid; abrupt smooth boundary.

BA—5 to 8 inches; brown (10YR 4/3) silt loam; moderate fine subangular blocky structure; friable; many fine roots; strongly acid; clear wavy boundary.

Bw1—8 to 18 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium subangular blocky structure; friable; common fine roots; moderately acid; clear wavy boundary.

Bw2—18 to 29 inches; yellowish brown (10YR 5/4) silt loam; weak medium subangular blocky structure; friable; common fine roots; moderately acid; clear wavy boundary.

C1—29 to 42 inches; brown (10YR 5/3) very fine sandy loam; massive; varves or bands of light gray (10YR 7/2) and brown (7.5YR 5/4); friable; moderately acid; clear wavy boundary.

C2—42 to 60 inches; yellowish brown (10YR 5/4) very fine sandy loam; massive separating to weak thin plates; few thin light gray (10YR 7/2) and strong brown (7.5YR 5/6) varves or bands; firm; moderately acid.

The solum ranges from 20 to 50 inches in thickness. Depth to bedrock is more than 60 inches. Typically, the solum is free of rock fragments, but in some places pebbles and thin layers of gravelly material are within the solum.

The A horizon has hue of 2.5Y to 7.5YR, value of 3 to 5, and chroma of 2 to 4. Its texture is silt loam or very fine sandy loam. Its reaction ranges from very strongly acid to moderately acid.

The Bw horizon has hue of 2.5Y to 7.5YR, value of 4 or 5, and chroma of 4 to 6. Its texture is very fine sandy loam or silt loam. Its reaction ranges from very strongly acid to moderately acid.

The C horizon has hue of 2.5Y to 7.5YR, value of 4 or 5, and chroma of 2 to 4. Its consistence is friable or firm. Its reaction is strongly acid to slightly acid. Its texture is similar to that of the B horizon.

Some pedons have a 2C horizon that is as much as 60 percent gravel, by volume.

Valois Series

The Valois series consists of very deep, well drained soils that formed in glacial till derived from sandstone, siltstone, and shale. These soils are on the sides of valleys and on small hills on uplands. Slope ranges from 3 to 50 percent.

Valois soils formed in parent material similar to that of moderately deep Lordstown soils and very deep Swartswood and Wurtsboro soils. Unlike Valois soils, Swartswood and Wurtsboro soils have a fragipan. Valois soils are also near very gravelly Chenango soils along valley sides. Valois soils are similar to but are yellower than Cheshire soils.

Typical pedon of Valois gravelly sandy loam, 3 to 8 percent slopes, in the town of Thompson, ½ mile northeast along Wolf Lake Road from intersection of Wolf Lake and Canal Roads, 400 feet north of Wolf Lake Road, at the edge of a borrow pit:

Oe—1 inch to 0; black (N 2/0) decomposed organic litter; extremely acid.

E—0 to 3 inches; brown (7.5YR 5/2) gravelly sandy

loam; weak fine subangular blocky structure; friable; common fine and medium roots; 15 percent gravel; extremely acid, abrupt wavy boundary.

Bhs—3 to 4 inches; dark reddish brown (5YR 3/3) gravelly sandy loam; weak fine subangular blocky structure parting to weak fine granular; friable; common fine and medium roots; 15 percent gravel; extremely acid; abrupt wavy boundary.

Bw1—4 to 9 inches; strong brown (7.5YR 5/6) gravelly sandy loam; weak fine and medium granular structure; friable; common fine and medium roots; common fine irregular pores; 15 percent gravel; extremely acid; clear smooth boundary.

Bw2—9 to 16 inches; yellowish brown (10YR 5/6) gravelly sandy loam; weak fine subangular blocky structure; friable; common fine and few medium roots; common fine irregular pores; 20 percent gravel; extremely acid; clear wavy boundary.

Bw3—16 to 25 inches; yellowish brown (10YR 5/4) gravelly sandy loam with common medium distinct yellowish red (5YR 4/6) streaks or bands; weak coarse subangular blocky structure; friable; few fine and medium roots; many fine and few medium irregular pores; 20 percent gravel; extremely acid; gradual wavy boundary.

2BC—25 to 36 inches; yellowish brown (10YR 5/4) gravelly sandy loam with pockets of loamy sand; massive; friable; few fine and medium roots; many medium irregular pores; 30 percent gravel; 2 percent rock fragments more than 3 inches long; extremely acid; gradual wavy boundary.

2C—36 to 62 inches; brown (10YR 5/3) gravelly sandy loam that has lenses of loamy sand and loam; massive; friable; common fine irregular pores; 30 percent gravel; 2 percent rock fragments more than 3 inches long; very strongly acid.

The solum ranges from 30 to 50 inches in thickness. Depth to bedrock is more than 60 inches. Rock fragments range from 5 to 35 percent, by volume, above a depth of 20 inches, from 20 to 35 percent between depths of 20 and 40 inches, and as much as 60 percent below a depth of 40 inches.

Some pedons have an A horizon that has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 or 3. Its texture in the fine earth fraction ranges from sandy loam to silt loam. Its reaction ranges from extremely acid to moderately acid.

The B horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3 to 6. Its texture in the fine earth fraction ranges from sandy loam to silt loam. Its reaction ranges from extremely acid to moderately acid.

The 2C horizon has hue of 7.5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 4. Its texture in the fine earth fraction is sandy loam and lenses of loamy sand and loam. Its reaction ranges from very strongly acid to moderately acid.

Wallington Series

The Wallington series consists of very deep, somewhat poorly drained soils that formed in lacustrine silts and very fine sands. These soils are on old lake plains, in silt-filled depressions, and on stream terraces. Slope ranges from 0 to 3 percent.

Wallington soils formed in parent material similar to that of Raynham soils and the better drained Scio soils. Wallington soils are also near Bash and Philo soils. Unlike associated soils Wallington soils have a fragipan.

Typical pedon of Wallington silt loam, in the town of Fallsburg, 50 feet west of Sandburg Creek, 400 feet southwest of Mountaindale Road, in a wooded area:

Oe—3 inches to 0; black (10YR 2/1) broken, very dark gray (10YR 3/1) rubbed, partly decomposed leaves and twigs; very friable; many fine and medium roots; very strongly acid; abrupt smooth boundary.

E1—0 to 1 inch; pale brown (10YR 6/3) silt loam; weak fine subangular blocky structure; friable; common fine and medium roots; few medium pores; strongly acid; clear smooth boundary.

E2—1 to 6 inches; pinkish gray (7.5YR 6/2) very fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; few fine pores; strongly acid; clear wavy boundary.

Bw1—6 to 11 inches; dark grayish brown (10YR 4/2) ped face, brown (10YR 5/3) ped interior, very fine sandy loam; some ped faces coated with thin black (5YR 2/1) humus layer; weak very coarse subangular blocky structure parting to fine subangular blocky; friable; few fine and medium pores; strongly acid; clear wavy boundary.

Bw2—11 to 16 inches; grayish brown (10YR 5/2) ped face, dark yellowish brown (10YR 4/4) ped interior, silt loam; many (25 percent) medium distinct strong brown (7.5YR 5/6) mottles and common medium distinct light brownish gray (10YR 6/2) mottles; weak very coarse subangular blocky structure parting to fine subangular blocky; friable; common fine and a few medium pores; strongly acid; clear wavy boundary.

Bx—16 to 33 inches; brown (10YR 5/3) silt loam; common medium distinct strong brown (7.5YR 5/6) mottles and a few fine distinct light brownish gray

(10YR 6/2) mottles; weak very coarse prismatic structure; massive within prisms; very firm and brittle; a few medium and common fine pores; strongly acid; gradual wavy boundary.

C—33 to 60 inches; brown (7.5YR 5/2) silt loam; common medium distinct strong brown (7.5YR 5/6) and a few medium distinct light gray (10YR 7/1) mottles; massive; firm; few fine pores; moderately acid.

The solum ranges from 30 to 60 inches in thickness. Depth to the fragipan ranges from 12 to 24 inches. Depth to bedrock is more than 60 inches.

Some pedons have an A horizon that has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. The texture is silt loam or very fine sandy loam. If the soils have not been limed, reaction is very strongly acid to slightly acid.

The E horizon has hue of 7.5YR to 2.5Y, value of 5 or 6, and chroma of 1 to 3. Its texture ranges from silt loam to very fine sandy loam. Its reaction is very strongly acid to slightly acid.

The Bw horizon has hue of 7.5YR to 10YR, value of 4 to 6, and chroma of 2 to 4. It has mottles that have high and low chroma. Its texture is silt loam or very fine sandy loam. If the soils have not been limed, reaction ranges from very strongly acid to moderately acid.

The Bx horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 4. Its texture is silt loam or very fine sandy loam. Its reaction ranges from strongly acid to slightly acid.

The C horizon has colors similar to those of the Bx horizon. Its texture ranges from silt loam to loamy very fine sand. Its reaction ranges from moderately acid to slightly acid.

Wayland Series

The Wayland series consists of very deep, poorly drained and very poorly drained soils on depressed parts of flood plains. These soils formed in recent alluvium of streams receiving material from upland soils that formed in sandstone, siltstone, and shale. Slope ranges from 0 to 3 percent.

Wayland soils are commonly near and formed in the same parent material as the well drained Pope soils and the moderately well drained Philo soils. In parts of the county Wayland soils are near the well drained Barbour soils and the somewhat poorly drained Bash soils that are redder in color. Excessively drained to well drained Suncook, Tunkhannock, and Chenango soils are on some terraces adjacent to Wayland soils. In Wayland soils the water table is closer to the surface than in these other soils.

Typical pedon of Wayland silt loam, in the town of Mamakating, 20 feet north of bank of Shawangunk Kill, 800 yards south of Bloomingburg, 650 yards east of County Road 62:

A—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam; moderate medium granular structure; friable; many fine roots; strongly acid; clear smooth boundary.

Bg1—7 to 14 inches; grayish brown (10YR 5/2) silt loam; few fine faint yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few large roots; many fine pores; strongly acid; clear smooth boundary.

Bg2—14 to 20 inches; grayish brown (2.5Y 5/2) silt loam; common medium faint gray (5Y 5/1) mottles and common medium prominent yellowish red (5YR 4/6) organic stains; weak medium granular structure; friable; common fine roots; strongly acid; abrupt smooth boundary.

Cg—20 to 32 inches; gray (10YR 6/1) silt loam; many (35 percent) medium prominent strong brown (7.5YR 5/6) mottles; massive; slightly sticky, slightly plastic; strongly acid; clear smooth boundary.

C—32 to 60 inches; multicolored, pale olive (5Y 6/3) (40 percent), yellowish brown (10YR 5/6) (35 percent), and gray (5Y 6/1) (25 percent) light silt loam; massive; slightly plastic; moderately acid.

The silty deposits over stratified materials range from 36 to 60 inches or more in thickness. Depth to bedrock is more than 60 inches. Rock fragments make up as much as 5 percent, by volume, above a depth of 36 inches and as much as 30 percent below that depth.

The Ap, or A, horizon is neutral or has hue of 2.5Y or 10YR, value of 2 or 3, and chroma of 0 to 2. Its texture is silt loam to silty clay loam. Its reaction ranges from strongly acid to slightly acid.

The B horizon is neutral or has hue of 2.5Y to 7.5YR, value of 3 to 6, and chroma of 0 to 2. Its texture is silt loam or silty clay loam. Its structure ranges from weak or moderate, fine or medium, subangular blocky to weak or moderate, coarse prismatic. Its reaction ranges from strongly acid to neutral.

The C horizon has hue of 5Y to 7.5YR, value of 3 to 6, and chroma of 1 or 2. Its texture ranges from silt loam to gravelly fine sandy loam. The horizon is massive or has a platy structure. Its consistence is friable or firm. Its reaction ranges from strongly acid to

neutral above a depth of 38 inches and from moderately acid to moderately alkaline below that depth.

Wellsboro Series

The Wellsboro series consists of very deep, moderately well drained soils that formed in glacial till derived from sandstone, siltstone, and shale. These soils are on till plains and the sides of hills on glaciated uplands. Slope ranges from 0 to 15 percent.

Wellsboro soils are near and formed in parent material similar to that of Lackawanna and Morris soils. Wellsboro soils are wetter than Lackawanna soils, but are better drained than Morris soils. On higher positions on the landscape Wellsboro soils are near moderately deep, better drained Oquaga soils. In parts of the survey area Wellsboro soils are near the coarser textured, browner Wurtsboro and Swartswood soils.

Typical pedon of Wellsboro gravelly loam, 3 to 8 percent slopes, in the town of Bethel, ½ mile south of White Lake along New York Route 55, 400 feet southeast of the intersection of New York Route 55 and Bethel Town Road No. 80:

Ap—0 to 7 inches; dark reddish brown (5YR 3/3) gravelly loam; moderate medium granular structure; friable; many fine common medium and a few coarse roots; many fine vesicular and a few tubular pores; 25 percent rock fragments; very strongly acid; abrupt smooth boundary.

Bw1—7 to 15 inches; reddish brown (5YR 4/4) loam; weak medium subangular blocky structure parting to weak fine granular; friable; common fine and medium roots; many fine common medium vesicular pores, a few medium tubular pores; 10 percent rock fragments; very strongly acid; clear wavy boundary.

Bw2—15 to 23 inches; reddish brown (5YR 5/4) gravelly loam; common coarse distinct strong brown (7.5YR 5/6) mottles and common coarse faint light reddish brown (5YR 6/3) mottles; weak coarse and medium subangular blocky structure; friable; few fine and medium roots; common fine vesicular and few medium tubular pores; 15 percent rock fragments; very strongly acid; clear smooth boundary.

Bx—23 to 66 inches; reddish brown (2.5YR 4/4) gravelly loam; few medium distinct strong brown (7.5YR 5/6) mottles in the upper part; weak very coarse prismatic structure; very firm and brittle; light brown (7.5YR 6/4) prism faces with yellowish red (5YR 5/8) borders; few fine roots along prism faces; common fine and medium vesicular pores, few fine tubular pores; patchy clay films in most pores and coating some rock fragments; 25 percent rock fragments; strongly acid.

The solum ranges from 40 to 75 inches in thickness. Depth to the fragipan ranges from 15 to 26 inches. Depth to bedrock is more than 60 inches. Rock fragments range from 0 to 30 percent, by volume, in individual horizons above the fragipan and from 10 to 45 percent in the fragipan and the C horizon.

The Ap horizon has hue of 5YR to 10YR, value of 3 or 4, and chroma of 2 or 3. In wooded areas the A horizon has similar hue to the Ap horizon, value of 2 to 4, and chroma of 2. Its texture in the fine earth fraction is loam or silt loam. Its reaction is very strongly acid to moderately acid.

The Bw horizon has hue of 2.5YR to 10YR, value of 4 or 5, and chroma of 3 to 6. Some pedons have subhorizons that have chroma of 2 below a depth of 20 inches. The B horizon has gray or brown mottles below a depth of 12 inches. Its texture in the fine earth fraction is loam or silt loam. Its reaction is very strongly acid to moderately acid.

The Bx horizon has hue of 10R to 5YR, value of 3 to 5, and chroma of 2 to 4. In some pedons it has gray or brown mottles. Its texture in the fine earth fraction ranges from sandy loam to silt loam. Its reaction is very strongly acid to moderately acid.

The C horizon has the same color, texture, and reaction as the Bx horizon.

Willowemoc Series

The Willowemoc series consists of very deep, moderately well drained soils that formed in glacial till derived from sandstone, siltstone, and shale. These soils are on till plains and hillsides on uplands. Slope ranges from 0 to 15 percent.

Willowemoc soils formed in the same kind of parent material as Lewbeach, Onteora, and Suny soils. They are wetter than Lewbeach soils but are better drained than Onteora and Suny soils. Willowemoc soils are near moderately deep Mongaup soils.

Typical pedon of Willowemoc silt loam, 8 to 15 percent slopes, in the town of Liberty, on the west side of Breezy Hill Road, 500 feet north of the intersection of Pearl Lake and Breezy Hill Roads:

A—0 to 4 inches; dark reddish brown (5YR 3/2) silt loam; moderate fine granular structure; very friable; many fine and few medium roots; common fine and few medium vesicular pores; 5 percent rock

fragments; very strongly acid; abrupt wavy boundary.

Bw1—4 to 16 inches; yellowish red (5YR 4/6) loam; weak fine subangular blocky structure parting to fine granular; friable; many common fine and medium roots; common fine and medium vesicular pores; 5 percent rock fragments; very strongly acid; clear wavy boundary.

Bw2—16 to 24 inches; reddish brown (5YR 5/3) gravelly fine sandy loam; thin lenses of brown (10YR 5/3) loamy sand; common medium distinct yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; friable; few fine roots; few medium tubular pores and common fine and medium vesicular pores; 25 percent rock fragments; strongly acid; clear wavy boundary.

Bx—24 to 60 inches; reddish brown (5YR 4/3) gravelly loam; few medium distinct strong brown (7.5YR 5/8) mottles; weak very coarse prismatic structure, weak medium platy and subangular blocky with prisms, and prism face is pale brown (10YR 6/3) with strong brown (7.5YR 5/8) border; very firm, brittle; common fine and medium vesicular pores; few fine tubular pores; thin clay coatings in some pores and on ped faces; 20 percent rock fragments; strongly acid.

The solum ranges from 35 to 60 inches or more in thickness. Depth to bedrock is more than 60 inches. Depth to the fragipan ranges from 17 to 26 inches. Rock fragments range from 5 to 35 percent, by volume, in the A and Bw horizons and from 15 to 50 percent in the Bx and C horizons. Most pedons do not have a C horizon.

The A horizon has hue of 5YR to 10YR, value of 2 to 4, and chroma of 1 to 3. Its texture in the fine earth fraction ranges from silt loam to fine sandy loam. Its reaction ranges from extremely acid to strongly acid. Some pedons have an O or E horizon.

The Bw horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 3 to 6. Its texture in the fine earth fraction is fine sandy loam, loam, or silt loam. Mottles in part of the Bw horizon are below a depth of 12 inches. Reaction of the horizon ranges from extremely acid to strongly acid.

The Bx horizon has hue of 2.5YR or 5YR, value of 3 to 5, and chroma of 2 to 4. Its texture in the fine earth fraction is sandy loam, fine sandy loam, or loam. Some pedons have gray or brown mottles. Prism face colors range from weak red to pale brown. Reaction ranges from extremely acid to strongly acid.

Some pedons have a C horizon that has color and texture similar to those of the Bx horizon. Reaction of the C horizon is strongly acid or moderately acid.

Wurtsboro Series

The Wurtsboro series consists of very deep, moderately well drained soils that formed in glacial till derived from sandstone, conglomerate, and shale. These soils are on till plains and the sides of hills on glaciated uplands. Slope ranges from 0 to 15 percent.

Wurtsboro soils are near and formed in parent material similar to that of Swartswood and Scriba soils. Wurtsboro soils are wetter than Swartswood soils but are better drained than Scriba soils. In parts of the survey area, Wurtsboro soils are also near better drained Lackawanna soils and the redder or siltier Wellsboro soils.

Typical pedon of Wurtsboro loam, 3 to 8 percent slopes, stony, in the town of Lumberland, 3.5 miles south from the intersection of Proctor Road (County Route 32) and Hollow Road, 1.2 miles west of Hollow Road on Black Forest Road, in a forested area:

Oe—2 inches to 0; black (N 2/0) decomposed leaf litter, very friable; many fine roots; abrupt wavy boundary.

E—0 to 2 inches; brown (7.5YR 5/2) loam; weak fine and medium subangular blocky structure; very friable; many fine and common medium roots; 10 percent rock fragments; strongly acid; abrupt wavy boundary.

Bw1—2 to 8 inches; yellowish brown (10YR 5/4) loam; weak medium and coarse subangular blocky structure parting to weak fine granular; friable; many fine and few medium and coarse roots; common fine vesicular and common medium tubular pores; 10 percent rock fragments; very strongly acid; clear smooth boundary.

Bw2—8 to 16 inches; brown (10YR 5/3) loam; weak medium and fine subangular blocky structure; friable; common fine and few medium and coarse roots; common fine vesicular and few medium tubular pores; 10 percent rock fragments; strongly acid; clear smooth boundary.

Bw3—16 to 26 inches; brown (10YR 5/3) loam; common coarse distinct yellowish red (5YR 5/8) mottles and common coarse faint light brownish gray (10YR 6/2) mottles; weak medium and fine subangular blocky structure; friable; few fine and medium roots; common fine vesicular and few medium pores; 5 percent rock fragments; strongly acid; clear wavy boundary.

Bx—26 to 60 inches; reddish brown (5YR 5/3) gravelly fine sandy loam; common coarse distinct reddish

yellow (7.5YR 6/8) mottles; pockets of pinkish gray (7.5YR 6/2) fine sandy loam; weak very coarse prismatic structure; firm and brittle; few medium roots along prism faces; common fine vesicular and common medium tubular pores; 15 percent rock fragments; strongly acid.

The solum ranges from 40 to 70 inches in thickness. Depth to the fragipan ranges from 17 to 28 inches. Depth to bedrock is more than 60 inches. Rock fragments range from 5 to 35 percent, by volume, above the fragipan and from 10 to 55 percent in the Bx and C horizons.

The E horizon has hue of 7.5YR to 10YR, value of 4 to 6, and chroma of 2 or 3. Some pedons have an A horizon that has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Texture of the E horizon in the fine earth fraction is loam, sandy loam, fine sandy loam, or silt loam. Its reaction ranges from strongly acid to extremely acid.

The Bw horizon has hue of 7.5YR and 10YR and value and chroma of 4 to 6. It has mottles of both high and low chroma between depths of 12 and 26 inches. Its reaction ranges from strongly acid to extremely acid. Its texture in the fine earth fraction ranges from sandy loam to loam.

The Bx horizon has hue of 5YR to 2.5Y, value of 4 or 5, and chroma of 2 to 6. Its reaction ranges from strongly acid to extremely acid. Its texture in the fine earth fraction ranges from sandy loam to loam.

The C horizon has colors, textures, and reaction that are similar to those of the Bx horizon.

Formation of the Soils

This section discusses the factors of soil formation and relates them to the soils in Sullivan County. It also defines the processes of soil horizon development as they relate to soil formation in the county.

Factors of Soil Formation

Soils are the products of weathering and other processes that act on parent material. The properties of the soil at a certain point on the earth depend on the combined effects of the following factors at that point: the physical and chemical composition of the parent material, climate, plant and animal life, topography, and time. The relative influence of each of these factors of soil formation differs from place to place, and each modifies the effect of the other four. For example, the effects of climate and of plant and animal life are influenced by relief and by the nature of the parent material. Although the factors are interrelated, in places one factor can be dominant and determine most of the properties of that soil.

Parent Material

Parent material is the unconsolidated earthy mass in which soils have formed or are forming. It determines the mineral composition and contributes greatly to the chemical composition of the soil. It also affects the rate at which soil-forming processes take place and the color of the soil.

Most of the soils in Sullivan County formed in different types of glacial deposits. The most extensive parent material is glacial till. Other parent material is glaciofluvial, or outwash deposits; glaciolacustrine, or lake-laid, deposits; recent stream alluvium; and accumulated organic materials.

The relationship between soils, the different types of parent material, landscape position, and drainage is shown in table 19.

Soils that formed in glacial till are the most extensive in the county and have a wide range of characteristics. A firm substratum and a fragipan horizon are common in the deeper soils that formed in glacial till. Lackawanna, Swartswood, and Wellsboro soils formed in thick deposits of glacial till. In many higher parts of the landscape the glacial till is moderately deep or shallow over bedrock. Arnot, Lordstown, and Oquaga soils formed in the thinner deposits of till. The content of till deposits is high in local bedrock. During the melting of the glacial ice, meltwater in huge quantities carried and sorted soil and rock debris. This outwash material was redeposited as layers of sand and gravel to form outwash terraces, kames, and deltas. Soils that formed in outwash deposits are commonly moderately coarse textured or coarse textured. Examples of these soils are Tunkhannock and Riverhead soils.

In larger valleys, such as in the Wurtsboro and Bloomingburg areas, meltwater was trapped in glacial lakes and silty or very fine sandy sediments were deposited in them. Scio and Raynham soils formed in these lacustrine deposits.

In more recent times floodwater from overflowing streams deposited alluvial material on valley bottoms. Soils that formed on flood plains, for example, Pope, Bash, and Wayland soils, commonly show little development of a soil profile.

Soils that formed in organic deposits include Carlisle and Greenwood soils.

Climate

Climate, particularly temperature and precipitation, is one of the most influential of the soil-forming factors. It largely determines the kind of weathering that occurs and affects the kind and growth of vegetation, leaching, and translocation of weathered materials.

The humid climate of the county tends to promote the development of moderately weathered, leached soils. The variation of the climate in the Catskill Mountains compared to other parts of the county has caused important differences in the soils that formed in the mountains. For example, wetness and the cool temperature in many of these areas have resulted in an accumulation of organic matter in the surface layer of

the soils. For more detailed information on climate, see the section "General Nature of the County."

Plant and Animal Life

All living organisms are important in soil formation. These include vegetation, animals, bacteria, and fungi. Large areas of the county are covered by forest of hardwood trees and of mixed hardwood and coniferous trees. Hardwood stands reduce the loss of nutrients caused by leaching by taking up nutrients and then returning them as leaf litter to the soil surface each year. Conifers take up smaller amounts of nutrients; therefore, leaching is greater under coniferous forest than it is under hardwoods. Where rooting depth is restricted, windthrow of trees results in considerable mixing of the soils. Vegetation mostly determines the amount of organic matter in the surface layer and affects its color and structure.

Earthworms and large burrowing animals also mix the soil and make it more permeable to air and water. Waste products of these animals aggregate soil particles and improve soil structure. Bacteria and fungi decompose organic material returned to the soil. These organisms also produce organic acids that help to weather minerals.

Human activities also have significantly affected many soils. Clearing and cultivating sloping land commonly results in greatly increased rates of erosion. Artificial drainage changes the environment of wet soils. Other farming practices alter physical and chemical properties of soils. Addition of nutrients, removal of organic material, and tillage practices change soil structure and so l chemistry, especially in the surface layer.

Topography

Slope and shape of the land surface determine to a considerable extent the amount of water that enters and passes through the soil and influences the depth of the water table.

The amount of water that stands on, is contained in, or moves through the soil affects the oxidation and the leaching, or the removal, of soluble minerals from the soil. The translocation of soil minerals and chemical compounds is greatest in permeable materials through which water can move readily.

In depressions, where the water table is at or near the surface for long periods, the subsoil generally is dull gray. In higher areas and on steeper or convex slopes, where the water table is deep, the subsoil commonly has bright colors of yellowish brown and reddish brown. On gentle to moderate concave slopes, the water table is shallower and fluctuates and mixed gray and yellowish brown colors are common.

In level areas and in depressions, the water table is at or near the surface and it affects the soil as follows. The surface layer is dark colored, and the subsoil has dominantly gray colors and common mottles of rusty brown and yellow.

Local differences in soils are mostly the result of differences in parent material and topography.

Time

Soils form in a slow process that requires many years. The soils of Sullivan County formed during the relatively short period of time since the last glaciation, 10,000 to 12,000 years ago. Thus, these soils are relatively young.

Soils that formed on flood plains that receive frequent deposits show very little soil development and are the youngest soils in the area. Suncook soils, for example, formed in recent deposits. They show little profile development and have indistinct horizons. Most soils in the county are classified as Inceptisols. Typically, Inceptisols develop on relatively young, but not recent, landscapes. Inceptisols have a number of well defined, easily distinguishable horizons. Lackawanna, Swartswood, and Scio soils are examples of Inceptisols.

Processes of Soil Formation

The action of the soil-forming factors results in the development of different layers, or horizons, in the soil. These soil horizons can be seen in a vertical cut of the soil known as a soil profile. The soil profile extends from the surface downward into material that is mostly unaffected by the soil-forming processes. Most soils have three major horizons, called the A, B, and C horizons *(9)*.

Among the processes that have lead to the development of soil horizons in Sullivan County are accumulation of organic matter, leaching of soluble salts and minerals, translocation of clay minerals, reduction and transfer of iron, and formation of a dense, compact subsoil.

Accumulation of organic matter darkens the surface layer and leads to the formation of an A horizon. Organic matter content commonly is 3 to 5 percent in the surface layer of soils in the county.

In the development of a distinct subsoil, some lime or some soluble salts must be leached before other processes, such as translocation of clay minerals, can

occur. Leaching is affected by the kinds of soluble salts originally in the soils, rate and depth of percolation, soil texture, and other factors.

An important process of soil horizon development in many soils in the county involves chemical and physical alteration of the parent material, aggregation of soil particles into peds, and loss of sesquioxides or bases. In some soils clay minerals have formed and in some pedons are thin coatings in some pores and on soil aggregates. In these soils strong brown or reddish brown is the characteristic color of the horizon. Valois and Cheshire soils show this kind of soil horizon development.

Development of a bleached eluvial horizon either just below the soil surface or deeper in the profile is another common soil horizon in the county. In this horizon clay and free iron oxides have been removed or oxides have been segregated, so that the uncoated sand and silt particles determine the color of the horizon. Swartswood, Lewbeach, and Morris soils all have eluvial horizons.

Gleying, or reduction and transfer of iron compounds, occurs in the wetter, more poorly drained soils. In very poorly drained soils, such as Alden soils, the grayish subsoil indicates the reduction of iron and its removal and transfer in solution. In somewhat poorly drained soils, such as Scriba and Morris soils, brownish yellow and reddish brown mottles indicate segregation of iron compounds.

A very firm and brittle horizon is in some soils that are extensive throughout the county. Wellsboro, Wurtsboro, Lackwanna, and Willowemoc soils are among those that have a well developed fragipan. A fragipan is firm and brittle when moist and very hard when dry. The development of fragipans is not completely understood. However, they are considered to be natural or genetic soil horizons. They are believed to be brittle and hard because of the binding of mineral grains by clay and cementation by silica and oxides of aluminum. Alternate shrinking and swelling during wet and dry periods may account for the dense packing of soil particles, consistent with a high bulk density, and the development of a polygonal pattern of vertical cracks evident in most fragipans.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Badland. Steep or very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on the contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Blowout. A shallow depression from which all or most of the soil material has been removed by wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Broad-base terrace. A ridge-type terrace built to control

erosion by diverting runoff along the contour at a nonscouring velocity. The terrace is 10 to 20 inches high and 15 to 30 feet wide and has gently sloping sides, a rounded crown, and a dish-shaped channel along the upper side. It may be nearly level or have a grade toward one or both ends.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Caliche. A more or less cemented deposit of calcium carbonate in soils of warm-temperate, subhumid to arid areas. Caliche occurs as soft, thin layers in the soil or as hard, thick beds just beneath the solum, or it is exposed at the surface by erosion.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of a standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Carrying capacity. The maximum stocking rate possible without inducing damage to vegetation or related resources. The rate may vary from year to year because of fluctuating forage production.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Catsteps. Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.

Cement rock. Shaly limestone used in the manufacture of cement.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). Excessive decrease in volume of soft soil under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and

iron oxide are common compounds in concretions.

Congeliturbate. Soil material disturbed by frost action.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long

enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess alkali (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above.

When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of Vertisols—clayey soils having a high coefficient of expansion and contraction with changes in moisture content.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike

that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, invader plants follow disturbance of the surface.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Kame (geology). An irregular, short ridge or hill of stratified glacial drift.

Karst (topography). The relief of an area underlain by

limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Muck. Dark colored, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Narrow-base terrace. A terrace no more than 4 to 8 feet wide at the base. A narrow-base terrace is similar to a broad-base terrace, except for the width of the ridge and channel.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Open space. A relatively undeveloped green or wooded area provided mainly within an urban area to minimize people's feelings of congested living.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by glacial meltwater.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil."

A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permafrost. Layers of soil, or even bedrock, occurring in arctic or subarctic regions, in which a temperature below freezing has existed continuously for a long time.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Pitting (in tables). Pits caused by melting ground ice. They form on the soil after plant cover is removed.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plinthite. The sesquioxide-rich, humus-poor, highly weathered mixture of clay with quartz and other diluents. It commonly appears as red mottles, usually in platy, polygonal, or reticulate patterns. Plinthite changes irreversibly to an ironstone hardpan or to irregular aggregates on repeated wetting and drying, especially if it is exposed also to heat from the sun. In a moist soil, plinthite can be cut with a spade. It is a form of laterite.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor, on the basis of how much the present plant community has departed from the potential.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are—

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5

Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slickensides. Polished and grooved surfaces produced

by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil is generally silty or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

Slow intake (in tables). The slow movement of water into the soil.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to Ca^{++} + Mg^{++}. The degrees of sodicity and their respective ratios are—

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in

color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but occurring in such a limited geographic area that creation of a new series is not justified.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer of a lamina or sequence of laminae deposited in a body of stillwater within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of stillwater in front of a glacier.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-80 at Liberty, New York)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January-----	29.8	12.2	21.0	54	-13	0	3.73	1.90	5.31	8	17.5
February----	31.5	12.7	22.1	55	-14	0	3.64	2.21	4.91	7	19.5
March-------	40.3	22.5	31.4	69	0	23	3.99	2.63	5.22	9	16.3
April-------	54.3	33.7	44.0	81	16	158	4.53	2.86	6.03	9	5.0
May---------	65.4	42.7	54.1	87	27	437	4.00	2.29	5.51	9	0.2
June--------	73.8	51.6	62.7	89	36	681	4.27	2.38	5.94	8	0.0
July--------	78.3	56.2	67.3	91	42	846	4.15	2.06	5.96	7	0.0
August------	76.9	54.7	65.8	89	40	800	4.63	2.47	6.52	7	0.0
September---	69.6	47.5	58.6	87	29	558	4.06	2.37	5.57	7	0.0
October-----	59.2	37.4	48.3	79	19	275	3.88	1.65	5.77	7	0.6
November----	46.2	29.5	37.9	69	10	59	4.33	2.82	5.70	8	6.6
December----	33.5	17.7	25.6	58	-7	10	4.37	2.57	5.97	9	17.6
Yearly:											
Average---	54.9	34.9	44.9	---	---	---	---	---	---	---	---
Extreme---	---	---	---	92	-16	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,847	49.58	43.03	55.88	95	83.3

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (40 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1951-80 at Liberty, New York)

Probability	Temperature		
	24° F or lower	28° F or lower	32° F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 24	May 15	May 29
2 years in 10 later than--	Apr. 20	May 9	May 24
5 years in 10 later than--	Apr. 13	Apr. 29	May 15
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 7	Sept. 28	Sept. 15
2 years in 10 earlier than--	Oct. 14	Oct. 4	Sept. 20
5 years in 10 earlier than--	Oct. 27	Oct. 16	Sept. 30

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-80 at Liberty, New York)

Probability	Length of growing season if temperature is--		
	Higher than 24° F	Higher than 28° F	Higher than 32° F
	Days	Days	Days
9 years in 10	172	141	117
8 years in 10	180	151	124
5 years in 10	196	169	137
2 years in 10	213	188	151
1 year in 10	221	197	158

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
Ad	Alden silt loam	3,101	0.5
AlC	Arnot-Lordstown complex, 0 to 15 percent slopes, very rocky	21,308	3.4
AlE	Arnot-Lordstown complex, 15 to 35 percent slopes, very rocky	15,743	2.5
AoC	Arnot-Oquaga complex, 0 to 15 percent slopes, very rocky	20,676	3.3
AoE	Arnot-Oquaga complex, 15 to 35 percent slopes, very rocky	18,825	3.0
ArC	Arnot-Rock outcrop complex, 0 to 15 percent slopes	4,051	0.6
ArE	Arnot-Rock outcrop complex, 15 to 35 percent slopes	4,752	0.8
ArF	Arnot-Rock outcrop complex, 35 to 70 percent slopes	12,573	2.0
Bb	Barbour loam	3,370	0.5
Bs	Bash silt loam	1,610	0.3
Ca	Carlisle muck	3,289	0.5
Ce	Carlisle, Palms and Alden soils, ponded	2,798	0.4
ChA	Chenango gravelly loam, 0 to 3 percent slopes	1,024	0.2
ChB	Chenango gravelly loam, 3 to 8 percent slopes	3,416	0.5
ChC	Chenango gravelly loam, 8 to 15 percent slopes	1,690	0.3
ChD	Chenango gravelly loam, 15 to 25 percent slopes	1,106	0.2
CsB	Cheshire channery loam, 3 to 8 percent slopes, stony	2,515	0.4
CsC	Cheshire channery loam, 8 to 15 percent slopes, stony	3,044	0.5
CsD	Cheshire channery loam, 15 to 25 percent slopes, stony	3,019	0.5
CsE	Cheshire channery loam, 25 to 35 percent slopes, stony	1,973	0.3
CsF	Cheshire channery loam, 35 to 60 percent slopes, stony	2,420	0.4
ElB	Elka loam, 3 to 8 percent slopes, bouldery	1,210	0.2
ElC	Elka loam, 8 to 15 percent slopes, bouldery	2,611	0.4
ElD	Elka loam, 15 to 25 percent slopes, bouldery	2,636	0.4
ElE	Elka loam, 25 to 35 percent slopes, bouldery	1,264	0.2
ElF	Elka loam, 35 to 50 percent slopes, bouldery	848	0.1
Fu	Fluvaquents-Udifluvents complex, frequently flooded	7,233	1.1
Gn	Greenwood peat	339	0.1
HaC	Hawksnest-Mongaup loams, strongly sloping, very rocky	15,592	2.5
HaE	Hawksnest-Mongaup loams, steep, very rocky	13,015	2.1
HeF	Hawksnest-Mongaup-Rock outcrop complex, very steep	5,877	0.9
LaB	Lackawanna channery loam, 3 to 8 percent slopes	4,868	0.8
LaC	Lackawanna channery loam, 8 to 15 percent slopes	7,670	1.2
LaD	Lackawanna channery loam, 15 to 25 percent slopes	7,819	1.2
LeB	Lewbeach silt loam, 3 to 8 percent slopes	2,052	0.3
LeC	Lewbeach silt loam, 8 to 15 percent slopes	3,492	0.6
LeD	Lewbeach silt loam, 15 to 25 percent slopes	2,238	0.4
LfE	Lewbeach silt loam, steep, very stony	6,797	1.1
LfF	Lewbeach silt loam, very steep, very stony	828	0.1
LoB	Lordstown silt loam, 3 to 8 percent slopes, stony	5,467	0.9
LrC	Lordstown-Arnot complex, 8 to 15 percent slopes, very stony	2,765	0.4
MaB	Manlius channery silt loam, 3 to 8 percent slopes	394	0.1
MaC	Manlius channery silt loam, 8 to 15 percent slopes	379	0.1
MaD	Manlius channery silt loam, 15 to 25 percent slopes	291	*
MdB	Mardin gravelly silt loam, 3 to 8 percent slopes	564	0.1
MdC	Mardin gravelly silt loam, 8 to 15 percent slopes	799	0.1
MnB	Mongaup loam, 3 to 8 percent slopes, very stony	3,753	0.6
MnC	Mongaup loam, 8 to 15 percent slopes, very stony	4,360	0.7
MnD	Mongaup loam, 15 to 25 percent slopes, very stony	1,432	0.2
MrA	Morris loam, 0 to 3 percent slopes	2,922	0.5
MrB	Morris loam, 3 to 8 percent slopes	7,160	1.1
MrC	Morris loam, 8 to 15 percent slopes	1,290	0.2
Ne	Neversink loam	3,071	0.5
Nf	Neversink and Alden soils, very stony	5,186	0.8
OaA	Onteora loam, 0 to 3 percent slopes	2,058	0.3
OaB	Onteora loam, 3 to 8 percent slopes	4,279	0.7
OaC	Onteora loam, 8 to 15 percent slopes	554	0.1
ObB	Onteora loam, 2 to 8 percent slopes, very stony	1,055	0.2
OeB	Oquaga very channery silt loam, 3 to 8 percent slopes	13,691	2.2
OgC	Oquaga-Arnot complex, 8 to 15 percent slopes	11,643	1.8
OgD	Oquaga-Arnot complex, 15 to 25 percent slopes	5,195	0.8
Os	Ossipee muck	626	0.1

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
OtA	Otisville gravelly loamy coarse sand, 0 to 3 percent slopes	485	0.1
OtB	Otisville gravelly loamy coarse sand, 3 to 8 percent slopes	505	0.1
OtC	Otisville gravelly loamy coarse sand, 8 to 15 percent slopes	229	*
OtD	Otisville gravelly loamy coarse sand, 15 to 25 percent slopes	302	*
Pa	Palms muck	3,856	0.6
Pe	Philo silt loam	463	0.1
Pg	Pits, gravel	1,095	0.2
Ph	Pits, quarry	242	*
PmA	Pompton gravelly fine sandy loam, 0 to 3 percent slopes	708	0.1
PmB	Pompton gravelly fine sandy loam, 3 to 8 percent slopes	761	0.1
Po	Pope silt loam, occasionally flooded	544	0.1
Pp	Pope very fine sandy loam, rarely flooded	694	0.1
Ra	Raynham silt loam	1,232	0.2
Re	Red Hook sandy loam	1,455	0.2
RhA	Riverhead sandy loam, 0 to 3 percent slopes	466	0.1
RhB	Riverhead sandy loam, 3 to 8 percent slopes	1,674	0.3
RhC	Riverhead sandy loam, 8 to 15 percent slopes	974	0.2
SaB	Scio silt loam, 2 to 6 percent slopes	939	0.1
ScA	Scriba loam, 0 to 3 percent slopes, stony	2,484	0.4
ScB	Scriba loam, 3 to 8 percent slopes, stony	2,560	0.4
SeB	Scriba and Morris loams, gently sloping, extremely stony	8,855	1.4
Sn	Suncook fine sandy loam	863	0.1
So	Suny fine sandy loam	1,089	0.2
Sp	Suny fine sandy loam, very stony	340	0.1
SrB	Swartswood gravelly loam, 3 to 8 percent slopes, stony	8,108	1.3
SrC	Swartswood gravelly loam, 8 to 15 percent slopes, stony	6,068	1.0
SrD	Swartswood gravelly loam, 15 to 25 percent slopes, stony	2,306	0.4
StE	Swartswood and Lackawanna soils, 25 to 35 percent slopes, stony	1,475	0.2
SwE	Swartswood and Lackawanna soils, steep, very stony	21,967	3.5
SwF	Swartswood and Lackawanna soils, very steep, very stony	2,090	0.3
TaB	Torull-Rock outcrop complex, 1 to 5 percent slopes	400	0.1
TeB	Tuller-Rock outcrop complex, 1 to 5 percent slopes	1,082	0.2
TkA	Tunkhannock gravelly loam, 0 to 3 percent slopes	1,451	0.2
TkB	Tunkhannock gravelly loam, 3 to 8 percent slopes	2,631	0.4
TkC	Tunkhannock gravelly loam, 8 to 15 percent slopes	1,245	0.2
TkD	Tunkhannock gravelly loam, 15 to 25 percent slopes	560	0.1
ToE	Tunkhannock and Otisville soils, steep	1,031	0.2
ToF	Tunkhannock and Otisville soils, very steep	972	0.2
Ud	Udorthents, smoothed	2,947	0.5
UnA	Unadilla silt loam, 0 to 2 percent slopes	213	*
UnB	Unadilla silt loam, 2 to 6 percent slopes	151	*
VaB	Valois gravelly sandy loam, 3 to 8 percent slopes	3,628	0.6
VaC	Valois gravelly sandy loam, 8 to 15 percent slopes	3,144	0.5
VaD	Valois gravelly sandy loam, 15 to 25 percent slopes	1,833	0.3
VaE	Valois gravelly sandy loam, 25 to 35 percent slopes	1,451	0.2
VaF	Valois gravelly sandy loam, 35 to 50 percent slopes	1,746	0.3
Wa	Wallington silt loam	354	0.1
Wd	Wayland silt loam	2,645	0.4
WeA	Wellsboro gravelly loam, 0 to 3 percent slopes	2,742	0.4
WeB	Wellsboro gravelly loam, 3 to 8 percent slopes	40,119	6.4
WeC	Wellsboro gravelly loam, 8 to 15 percent slopes	24,881	3.9
WlC	Wellsboro and Wurtsboro soils, strongly sloping, extremely stony	88,442	13.8
WmA	Willowemoc silt loam, 0 to 3 percent slopes	252	*
WmB	Willowemoc silt loam, 3 to 8 percent slopes	14,578	2.3
WmC	Willowemoc silt loam, 8 to 15 percent slopes	12,117	1.9
WoC	Willowemoc silt loam, strongly sloping, very stony	17,100	2.7
WuA	Wurtsboro loam, 0 to 3 percent slopes, stony	2,558	0.4
WuB	Wurtsboro loam, 3 to 8 pecent slopes, stony	16,886	2.7
WuC	Wurtsboro loam, 8 to 15 percent slopes, stony	6,144	1.0
	Water	5,282	0.8
	Total	631,040	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
Bb	Barbour loam
Bs	Bash silt loam (where drained)
ChA	Chenango gravelly loam, 0 to 3 percent slopes
ChB	Chenango gravelly loam, 3 to 8 percent slopes
LaB	Lackawanna channery loam, 3 to 8 percent slopes
LeB	Lewbeach silt loam, 3 to 8 percent slopes
LoB	Lordstown silt loam, 3 to 8 percent slopes, stony
Pe	Philo silt loam
PmA	Pompton gravelly fine sandy loam, 0 to 3 percent slopes
PmB	Pompton gravelly fine sandy loam, 3 to 8 percent slopes
Po	Pope silt loam, occasionally flooded
Pp	Pope very fine sandy loam, rarely flooded
Ra	Raynham silt loam (where drained)
Re	Red Hook sandy loam (where drained)
RhA	Riverhead sandy loam, 0 to 3 percent slopes
RhB	Riverhead sandy loam, 3 to 8 percent slopes
SaB	Scio silt loam, 2 to 6 percent slopes
TkA	Tunkhannock gravelly loam, 0 to 3 percent slopes
TkB	Tunkhannock gravelly loam, 3 to 8 percent slopes
UnA	Unadilla silt loam, 0 to 2 percent slopes
UnB	Unadilla silt loam, 2 to 6 percent slopes
VaB	Valois gravelly sandy loam, 3 to 8 percent slopes
Wa	Wallington silt loam (where drained)

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Corn silage	Oats	Alfalfa hay	Grass hay	Trefoil-grass hay	Pasture
		Bu	Tons	Bu	Tons	Tons	Tons	AUM*
Ad-------------- Alden	IVw	---	18	---	---	1.5	2.0	5.0
AlC------------- Arnot-Lordstown	VIs	---	---	---	---	---	---	3.0
AlE------------- Arnot-Lordstown	VIIs	---	---	---	---	---	---	---
AoC------------- Arnot-Oquaga	VIs	---	15	67	2.9	---	---	4.0
AoE------------- Arnot-Oquaga	VIIs	---	---	---	---	---	---	2.5
ArC**----------- Arnot-Rock outcrop	VIs	---	---	---	---	---	---	---
ArE**----------- Arnot-Rock outcrop	VIIs	---	---	---	---	---	---	---
ArF**----------- Arnot-Rock outcrop	VIIs	---	---	---	---	---	---	---
Bb-------------- Barbour	I	120	24	80	4.5	3.0	4.0	8.5
Bs-------------- Bash	IIIw	---	15	60	---	2.5	3.0	5.5
Ca-------------- Carlisle	Vw	---	---	---	---	---	---	---
Ce-------------- Carlisle, Palms and Alden	VIIIw	---	---	---	---	---	---	---
ChA------------- Chenango	IIs	90	18	70	4.0	2.5	3.0	7.5
ChB------------- Chenango	IIs	90	18	70	4.0	2.5	3.0	7.5
ChC------------- Chenango	IIIe	80	16	60	3.5	2.0	2.5	6.5
ChD------------- Chenango	IVe	70	14	50	3.0	2.0	2.5	5.5
CsB------------- Cheshire	IIe	80	24	---	4.5	4.0	---	7.0

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Oats	Alfalfa hay	Grass hay	Trefoil-grass hay	Pasture
		Bu	Tons	Bu	Tons	Tons	Tons	AUM*
CsC------------- Cheshire	IIIe	75	22	---	4.5	4.0	---	6.5
CsD------------- Cheshire	IVe	---	18	---	4.0	3.5	---	6.5
CsE------------- Cheshire	VIe	---	---	---	---	---	---	---
CsF------------- Cheshire	VIIe	---	---	---	---	---	---	---
ElB------------- Elka	IIe	90	18	70	3.5	---	---	7.5
ElC------------- Elka	IIIe	85	17	70	3.5	---	---	7.5
ElD------------- Elka	IVe	80	16	65	3.5	---	---	6.5
ElE------------- Elka	VIe	---	---	---	---	---	---	---
ElF------------- Elka	VIIe	---	---	---	---	---	---	---
Fu-------------- Fluvaquents-Udifluvents	Vw	---	---	---	---	---	---	---
Gn-------------- Greenwood	Vw	---	---	---	---	---	---	---
HaC------------- Hawksnest-Mongaup	VIs	---	---	---	---	---	---	---
HaE------------- Hawksnest-Mongaup	VIIs	---	---	---	---	---	---	---
HeF**----------- Hawksnest-Mongaup-Rock outcrop	VIIs	---	---	---	---	---	---	---
LaB------------- Lackawanna	IIe	90	20	75	4.0	3.5	4.0	7.5
LaC------------- Lackawanna	IIIe	90	19	75	4.0	3.5	4.0	7.5
LaD------------- Lackawanna	IVe	75	15	60	3.5	2.5	3.5	7.0
LeB------------- Lewbeach	IIe	90	15	70	3.5	3.0	3.5	6.5
LeC------------- Lewbeach	IIIe	80	14	70	3.0	3.0	3.0	5.5

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Oats	Alfalfa hay	Grass hay	Trefoil-grass hay	Pasture
		Bu	Tons	Bu	Tons	Tons	Tons	AUM*
LeD------------- Lewbeach	IVe	---	13	50	2.5	2.5	2.5	4.5
LfE, LfF-------- Lewbeach	VIIs	---	---	---	---	---	---	2.0
LoB------------- Lordstown	IIe	85	17	75	3.5	2.5	3.0	6.5
LrC------------- Lordstown-Arnot	VIs	---	---	---	---	---	---	5.1
MaB------------- Manlius	IIe	80	16	70	3.0	2.5	3.0	6.5
MaC------------- Manlius	IIIe	75	15	65	3.0	2.5	3.0	6.5
MaD------------- Manlius	IVe	70	14	50	2.5	2.0	2.5	6.0
MdB------------- Mardin	IIw	90	---	70	4.0	---	---	7.5
MdC------------- Mardin	IIIe	85	---	65	4.0	---	---	7.5
MnB, MnC, MnD--- Mongaup	VIs	---	---	---	---	---	---	---
MrA, MrB-------- Morris	IIIw	---	15	50	---	2.5	2.5	6.0
MrC------------- Morris	IIIe	---	15	50	---	2.5	2.5	6.0
Ne-------------- Neversink	IVw	---	---	---	---	2.5	---	5.0
Nf-------------- Neversink and Alden	VIIs	---	---	---	---	---	---	---
OaA, OaB-------- Onteora	IIIw	---	10.0	40	---	2.0	2.0	5.0
OaC------------- Onteora	IIIe	---	10.0	40	---	2.0	2.0	5.0
ObB------------- Onteora	VIIs	---	---	---	---	---	---	2.0
OeB------------- Oquaga	IIe	75	17	75	3.5	---	---	6.5
OgC------------- Oquaga-Arnot	IIIe	75	15	62	2.9	2.5	3.0	6.5
OgD------------- Oquaga-Arnot	IVe	70	15	50	2.5	2.0	2.5	6.0

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Oats	Alfalfa hay	Grass hay	Trefoil-grass hay	Pasture
		Bu	Tons	Bu	Tons	Tons	Tons	AUM*
Os---------------- Ossipee	Vw	---	---	---	---	---	---	---
OtA, OtB, OtC--- Otisville	IVs	60	12	45	3.0	2.0	2.5	4.0
OtD-------------- Otisville	VIs	---	---	---	---	---	---	2.5
Pa---------------- Palms	Vw	---	---	---	---	---	---	---
Pe---------------- Philo	IIw	90	18	60	3.5	3.0	3.5	7.0
Pg**, Ph**. Pits								
PmA-------------- Pompton	IIw	90	18	---	4.0	2.5	3.0	6.0
PmB-------------- Pompton	IIw	110	24	---	4.0	2.5	3.0	6.0
Po---------------- Pope	IIw	130	---	80	---	---	---	8.0
Pp---------------- Pope	I	130	---	80	---	---	---	8.0
Ra---------------- Raynham	IIIw	80	15	60	---	3.0	3.0	5.5
Re---------------- Red Hook	IIIw	---	15	60	---	3.0	3.0	5.5
RhA, RhB--------- Riverhead	IIs	95	19	70	5.0	3.0	4.5	8.0
RhC-------------- Riverhead	IIIe	85	17	65	4.5	2.5	4.0	7.5
SaB-------------- Scio	IIe	110	22	85	4.5	3.5	3.5	7.5
ScA-------------- Scriba	IIIw	---	10	45	---	2.0	2.0	5.5
ScB-------------- Scriba	IIIw	---	10	45	---	2.0	2.0	5.5
SeB-------------- Scriba and Morris	VIIs	---	---	---	---	---	---	2.0
Sn---------------- Suncook	IIIs	---	12	---	2.5	2.0	---	3.5
So---------------- Suny	IVw	---	---	---	---	1.5	---	3.5

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Oats	Alfalfa hay	Grass hay	Trefoil-grass hay	Pasture
		Bu	Tons	Bu	Tons	Tons	Tons	AUM*
Sp------------- Suny	VIIs	---	---	---	---	---	---	---
SrB------------ Swartswood	IIe	90	20	70	3.5	3.0	3.5	7.0
SrC------------ Swartswood	IIIe	85	18	65	3.5	3.0	3.5	7.0
SrD------------ Swartswood	IVe	80	16	65	3.0	2.0	3.0	6.5
StE------------ Swartswood and Lackawanna	VIe	---	---	---	---	---	---	2.0
SwE, SwF-------- Swartswood and Lackawanna	VIIe	---	---	---	---	---	---	2.0
TaB**---------- Torull-Rock outcrop	VIs	---	---	---	---	---	---	2.0
TeB**---------- Tuller-Rock outcrop	VIs	---	---	---	---	---	---	2.0
TkA------------ Tunkhannock	IIs	90	18	75	4.0	2.5	3.0	7.5
TkB------------ Tunkhannock	IIs	90	18	75	4.0	2.5	3.0	7.5
TkC------------ Tunkhannock	IIIe	75	16	65	3.5	2.0	2.5	6.5
TkD------------ Tunkhannock	IVe	70	14	50	3.0	2.0	2.5	5.5
ToE------------ Tunkhannock and Otisville	VIe	---	---	---	---	---	---	2.5
ToF------------ Tunkhannock and Otisville	VIIe	---	---	---	---	---	---	2.5
Ud. Udorthents								
UnA------------ Unadilla	I	125	25	80	5.0	3.5	4.0	8.0
UnB------------ Unadilla	IIe	120	24	80	5.0	3.5	4.0	7.5
VaB------------ Valois	IIe	100	20	75	4.0	3.0	3.5	7.5

See footnotes at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Soil name and map symbol	Land capability	Corn	Corn silage	Oats	Alfalfa hay	Grass hay	Trefoil-grass hay	Pasture
		Bu	Tons	Bu	Tons	Tons	Tons	AUM*
VaC-------------- Valois	IIIe	95	19	75	4.0	3.0	3.5	7.0
VaD-------------- Valois	IVe	75	16	60	3.5	3.0	3.0	6.5
VaE-------------- Valois	VIe	---	---	---	---	---	---	2.0
VaF-------------- Valois	VIIe	---	---	---	---	---	---	---
Wa--------------- Wallington	IIIw	---	12	50	---	2.5	2.5	6.0
Wd--------------- Wayland	Vw	---	---	---	---	2.0	2.0	4.0
WeA, WeB--------- Wellsboro	IIw	90	18	70	4.0	3.0	35	7.5
WeC-------------- Wellsboro	IIIe	85	17	65	4.0	3.0	3.5	7.5
WlC-------------- Wellsboro and Wurtsboro	VIIs	---	---	---	---	---	---	2.0
WmA, WmB--------- Willowemoc	IIw	80	14	55	3.0	2.5	3.0	6.5
WmC-------------- Willowemoc	IIIe	75	13	50	2.5	2.0	2.5	6.5
WoC-------------- Willowemoc	VIs	---	---	---	---	---	---	---
WuA, WuB--------- Wurtsboro	IIw	80	16	60	3.5	3.0	3.0	7.0
WuC-------------- Wurtsboro	IIIe	75	15	55	3.0	2.5	3.0	7.0

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.
** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	4,277	---	---	---
II	133,860	43,023	80,175	10,662
III	114,722	87,745	26,114	863
IV	35,483	27,003	7,261	1,219
V	17,988	---	17,988	---
VI	100,015	7,194	---	92,821
VII	212,331	30,043	---	182,288
VIII	2,798	---	2,798	---

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
Ad-------------- Alden	2W	Slight	Severe	Severe	Severe	Red maple-----------	50	2	White spruce, northern white-cedar.
AlC**:									
Arnot----------	3D	Slight	Slight	Severe	Moderate	Northern red oak----	55	3	Eastern white pine, red pine.
						Sugar maple---------	50	2	
						Eastern white pine--	55	6	
						White ash-----------	55	2	
Lordstown------	4A	Slight	Slight	Slight	Slight	Northern red oak----	70	4	Eastern white pine, European larch, red pine, Norway spruce.
						Sugar maple---------	73	3	
						White ash-----------	75	3	
AlE**:									
Arnot----------	3D	Slight	Moderate	Severe	Moderate	Northern red oak----	55	3	Eastern white pine, red pine.
						Sugar maple---------	50	2	
						Eastern white pine--	55	6	
						White ash-----------	55	2	
Lordstown------	4R	Slight	Moderate	Slight	Slight	Northern red oak----	70	4	Eastern white pine, European larch, red pine, Norway spruce.
						Sugar maple---------	73	3	
						White ash-----------	75	3	
AoC**:									
Arnot----------	3D	Slight	Slight	Severe	Moderate	Northern red oak----	55	3	Eastern white pine, red pine.
						Sugar maple---------	50	2	
						Eastern white pine--	55	6	
						White ash-----------	55	2	
Oquaga---------	3A	Slight	Slight	Slight	Slight	Sugar maple---------	69	3	Eastern white pine, red pine, European larch, Norway spruce, black cherry.
						Northern red oak----	71	4	
						Black cherry--------	72	3	
						Eastern white pine--	75	10	
AoE**:									
Arnot----------	3D	Slight	Moderate	Severe	Moderate	Northern red oak----	55	3	Eastern white pine, red pine.
						Sugar maple---------	50	2	
						Eastern white pine--	55	6	
						White ash-----------	55	2	
Oquaga---------	3R	Slight	Moderate	Slight	Slight	Sugar maple---------	69	3	Eastern white pine, red pine, European larch, Norway spruce, black cherry.
						Northern red oak----	71	4	
						Black cherry--------	72	3	
						Eastern white pine--	75	10	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
ArC**:									
Arnot----------	3D	Slight	Slight	Severe	Moderate	Northern red oak----	55	3	Eastern white pine, red pine.
						Sugar maple---------	50	2	
						Eastern white pine--	55	6	
						White ash-----------	55	2	
Rock outcrop.									
ArE**:									
Arnot----------	3D	Slight	Moderate	Severe	Moderate	Northern red oak----	55	3	Eastern white pine, red pine.
						Sugar maple---------	50	2	
						Eastern white pine--	55	6	
						White ash-----------	55	2	
Rock outcrop.									
ArF**:									
Arnot----------	3R	Moderate	Severe	Severe	Moderate	Northern red oak----	55	3	Eastern white pine, red pine.
						Sugar maple---------	50	2	
						Eastern white pine--	55	6	
						White ash-----------	55	2	
Rock outcrop.									
Bb-------------- Barbour	3A	Slight	Slight	Slight	Slight	Sugar maple---------	70	3	Eastern white pine, Norway spruce, black walnut.
						Northern red oak----	80	4	
Bs-------------- Bash	3W	Slight	Moderate	Moderate	Moderate	Red maple-----------	70	3	Norway spruce.
						White ash-----------	70	3	
Ca-------------- Carlisle	2W	Slight	Severe	Severe	Severe	Red maple-----------	56	2	---
						White ash-----------	---	---	
						Green ash-----------	---	---	
						Quaking aspen-------	---	---	
						Swamp white oak-----	---	---	
						Silver maple--------	82	2	
Ce**:									
Carlisle-------	2W	Slight	Severe	Severe	Severe	Red maple-----------	56	2	---
						White ash-----------	---	---	
						Green ash-----------	---	---	
						Quaking aspen-------	---	---	
						Swamp white oak-----	---	---	
						Silver maple--------	82	2	
Palms----------	2W	Slight	Severe	Severe	Severe	Red maple-----------	55	2	---
						Silver maple--------	---	---	
						White ash-----------	---	---	
						Quaking aspen-------	---	---	
						Northern white-cedar	---	---	
						Tamarack------------	---	---	
						Black ash-----------	---	---	
Alden----------	2W	Slight	Severe	Severe	Severe	Red maple-----------	50	2	White spruce, northern white-cedar.

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi-nation symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equip-ment limita-tion	Seedling mortal-ity	Wind-throw hazard	Common trees	Site index	Produc-tivity class*	
ChA, ChB, ChC--- Chenango	3	Slight	Slight	Slight	Slight	Sugar maple---------	70	3	Eastern white pine, red pine, European larch.
						Northern red oak----	80	4	
ChD------------ Chenango	3R	Slight	Moderate	Slight	Slight	Sugar maple---------	70	3	Eastern white pine, red pine, European larch.
						Northern red oak----	80	4	
CsB, CsC-------- Cheshire	3A	Slight	Slight	Slight	Slight	Northern red oak----	60	3	Eastern white pine, eastern hemlock, European larch.
						Eastern white pine--	65	8	
						Shagbark hickory----	---	---	
						Sugar maple---------	---	---	
CsD, CsE-------- Cheshire	3R	Moderate	Moderate	Slight	Slight	Northern red oak----	60	3	Eastern white pine, eastern hemlock, European larch.
						Eastern white pine--	65	8	
						Shagbark hickory----	---	---	
						Sugar maple---------	---	---	
CsF------------ Cheshire	3R	Severe	Severe	Slight	Slight	Northern red oak----	60	3	Eastern white pine, eastern hemlock, European larch.
						Eastern white pine--	65	8	
						Shagbark hickory----	---	---	
						Sugar maple---------	---	---	
ElB, ElC-------- Elka	3A	Slight	Slight	Slight	Slight	Sugar maple---------	70	3	White spruce, Norway spruce, Douglas-fir, red pine, European larch.
						Northern red oak----	75	4	
						Red maple-----------	75	3	
						American beech------	70	3	
						Eastern white pine--	75	10	
ElD, ElE-------- Elka	3R	Slight	Moderate	Slight	Slight	Sugar maple---------	70	3	White spruce, Norway spruce, Douglas-fir, red pine, European larch.
						Northern red oak----	75	4	
						Red maple-----------	75	3	
						American beech------	70	3	
						Eastern white pine--	75	10	
ElF------------ Elka	3R	Moderate	Severe	Slight	Slight	Sugar maple---------	70	3	White spruce, Norway spruce, Douglas-fir, red pine, European larch.
						Northern red oak----	75	4	
						Red maple-----------	75	3	
						American beech------	70	3	
						Eastern white pine--	75	10	
Gn------------- Greenwood	2W	Slight	Severe	Severe	Severe	Black spruce--------	15	2	---
						Balsam fir----------	39	5	
						Tamarack------------	---	---	
						Red maple-----------	---	---	
HaC**: Hawksnest------	3D	Slight	Slight	Severe	Moderate	Sugar maple---------	60	3	Red pine, European larch, Norway spruce.
						Beech---------------	55	2	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
HaC**:									
Mongaup	3A	Slight	Slight	Slight	Slight	Sugar maple	70	3	Red pine, European larch, Norway spruce.
						Beech	---	---	
						Black cherry	---	---	
						Red maple	---	---	
HaE**:									
Hawksnest	3D	Slight	Moderate	Severe	Moderate	Sugar maple	60	3	Red pine, European larch, Norway spruce.
						Beech	55	2	
Mongaup	3R	Slight	Moderate	Slight	Slight	Sugar maple	70	3	Red pine, European larch, Norway spruce.
						Beech	---	---	
						Black cherry	---	---	
						Red maple	---	---	
HeF**:									
Hawksnest	3R	Moderate	Severe	Severe	Moderate	Sugar maple	60	3	Red pine, European larch, Norway spruce.
						Beech	55	2	
Mongaup	3R	Moderate	Severe	Slight	Slight	Sugar maple	70	3	Red pine, European larch, Norway spruce.
						Beech	---	---	
						Black cherry	---	---	
						Red maple	---	---	
Rock outcrop.									
LaB, LaC Lackawanna	4A	Slight	Slight	Slight	Slight	Northern red oak	70	4	Eastern white pine, red pine, Norway spruce, European larch.
						Black cherry	75	3	
						Sugar maple	70	3	
						White ash	70	3	
LaD Lackawanna	4R	Slight	Moderate	Slight	Slight	Northern red oak	70	4	Eastern white pine, red pine, Norway spruce, European larch.
						Black cherry	75	3	
						Sugar maple	70	3	
						White ash	70	3	
LeB, LeC Lewbeach	3A	Slight	Slight	Slight	Slight	Sugar maple	70	3	Norway spruce, eastern white pine, red pine, white spruce.
						Black cherry	75	3	
						American beech	---	---	
						Yellow birch	---	---	
						White ash	---	---	
LeD Lewbeach	3R	Slight	Moderate	Slight	Slight	Sugar maple	70	3	Norway spruce, eastern white pine, red pine, white spruce.
						Black cherry	75	3	
						American beech	---	---	
						Yellow birch	---	---	
						White ash	---	---	
LfE Lewbeach	3R	Slight	Moderate	Slight	Slight	Sugar maple	70	3	Norway spruce, white spruce.
						Black cherry	70	3	
						American beech	---	---	
						Yellow birch	---	---	
						White ash	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
LfF------------- Lewbeach	3R	Moderate	Severe	Slight	Slight	Sugar maple--------- Black cherry-------- American beech------ Yellow birch-------- White ash-----------	70 70 --- --- ---	3 3 --- --- ---	Norway spruce, white spruce.
LoB------------- Lordstown	4A	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple--------- White ash-----------	70 73 75	4 3 3	Eastern white pine, European larch, red pine, Norway spruce.
LrC**:									
Lordstown------	3A	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak---- White ash-----------	70 60 75	3 3 3	Eastern white pine, red pine, European larch, Norway spruce.
Arnot----------	3D	Slight	Slight	Severe	Moderate	Northern red oak---- Sugar maple--------- Eastern white pine-- White ash-----------	55 50 55 55	3 2 6 2	Eastern white pine, red pine, European larch.
MaB, MaC-------- Manlius	4A	Slight	Slight	Slight	Slight	Northern red oak---- Black cherry-------- Sugar maple---------	70 70 70	4 3 3	Eastern white pine, red pine, black cherry, Norway spruce, European larch.
MaD------------- Manlius	4R	Slight	Moderate	Slight	Slight	Northern red oak---- Black cherry-------- Sugar maple---------	70 70 70	4 3 3	Eastern white pine, red pine, black cherry, Norway spruce, European larch.
MdB, MdC-------- Mardin	3A	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak---- Black cherry-------- White ash-----------	60 63 70 70	3 3 3 3	Red pine, European larch, Norway spruce, eastern white pine, white spruce.
MnB, MnC-------- Mongaup	3A	Slight	Slight	Slight	Slight	Sugar maple--------- Beech--------------- Black cherry-------- Red maple-----------	70 --- --- ---	3 --- --- ---	Red pine, European larch, Norway spruce.
MnD------------- Mongaup	3R	Slight	Moderate	Slight	Slight	Sugar maple--------- Beech--------------- Black cherry-------- Red maple-----------	70 --- --- ---	3 --- --- ---	Red pine, European larch, Norway spruce.

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
MrA, MrB, MrC---Morris	3W	Slight	Moderate	Moderate	Moderate	Northern red oak----	65	3	Eastern white pine, Norway spruce, white spruce, European larch.
						Sugar maple---------	79	4	
						Black cherry--------	69	3	
						White ash-----------	71	3	
Ne--------------Neversink	3W	Slight	Severe	Severe	Severe	Red maple-----------	60	3	White spruce, northern white-cedar.
						Hemlock-------------	---	---	
Nf**:									
Neversink------	3W	Slight	Severe	Severe	Severe	Red maple-----------	60	3	White spruce, northern white-cedar.
						Hemlock-------------	---	---	
Alden----------	2W	Slight	Severe	Severe	Severe	Red maple-----------	50	2	White spruce, northern white-cedar.
OaA, OaB, OaC, ObB------------Onteora	3W	Slight	Moderate	Moderate	Moderate	Red maple-----------	75	3	Eastern white pine, white spruce, Norway spruce.
						Hemlock-------------	---	---	
						Beech---------------	60	3	
OeB-------------Oquaga	3A	Slight	Slight	Slight	Slight	Sugar maple---------	69	3	Eastern white pine, red pine, European larch, Norway spruce, black cherry.
						Northern red oak----	71	4	
						Black cherry--------	72	3	
						Eastern white pine--	75	10	
OgC**:									
Oquaga---------	3A	Slight	Slight	Slight	Slight	Sugar maple---------	69	3	Eastern white pine, red pine, European larch, Norway spruce, black cherry.
						Northern red oak----	71	4	
						Black cherry--------	72	3	
						Eastern white pine--	75	10	
Arnot----------	3D	Slight	Slight	Severe	Moderate	Northern red oak----	55	3	Eastern white pine, red pine.
						Sugar maple---------	50	2	
						Eastern white pine--	55	6	
						White ash-----------	55	2	
OgD**:									
Oquaga---------	3R	Slight	Moderate	Slight	Slight	Sugar maple---------	69	3	Eastern white pine, red pine, European larch, Norway spruce, black cherry.
						Northern red oak----	71	4	
						Black cherry--------	72	3	
						Eastern white pine--	75	10	
Arnot----------	3D	Slight	Moderate	Severe	Moderate	Northern red oak----	55	3	Eastern white pine, red pine.
						Sugar maple---------	50	2	
						Eastern white pine--	55	6	
						White ash-----------	55	2	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi-nation symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equip-ment limita-tion	Seedling mortal-ity	Wind-throw hazard	Common trees	Site index	Produc-tivity class*	
Os------------- Ossipee	5W	Slight	Severe	Severe	Severe	Black spruce--------	---	---	---
						Tamarack-----------	---	---	
						Balsam fir----------	---	---	
						Yellow birch--------	---	---	
						Black ash-----------	---	---	
OtA, OtB, OtC--- Otisville	8S	Slight	Slight	Severe	Slight	Eastern white pine--	65	8	Eastern white pine, European larch, red pine.
						Northern red oak----	60	3	
						Sugar maple---------	55	2	
						White oak-----------	60	3	
						Black oak-----------	60	3	
OtD------------- Otisville	8S	Slight	Moderate	Severe	Slight	Eastern white pine--	65	8	Eastern white pine, European larch, red pine.
						Northern red oak----	60	3	
						Sugar maple---------	55	2	
						White oak-----------	60	3	
						Black oak-----------	60	3	
Pa-------------- Palms	2W	Slight	Severe	Severe	Severe	Red maple-----------	55	2	---
						Silver maple--------	---	---	
						White ash-----------	---	---	
						Quaking aspen-------	---	---	
						Northern white-cedar	---	---	
						Tamarack------------	---	---	
						Black ash-----------	---	---	
Pe-------------- Philo	4W	Slight	Moderate	Slight	Slight	Northern red oak----	86	4	Eastern white pine, yellow-poplar.
						Yellow-poplar-------	102	8	
						Virginia pine-------	74	8	
						Black oak-----------	85	4	
						White oak-----------	85	4	
						White ash-----------	85	4	
PmA, PmB-------- Pompton	4W	Slight	Moderate	Moderate	Moderate	Pin oak-------------	75	4	Eastern white pine, red pine, European larch.
						White ash-----------	---	---	
						White oak-----------	---	---	
Po, Pp---------- Pope	7A	Slight	Slight	Slight	Slight	Yellow-poplar-------	96	7	Eastern white pine, yellow-poplar, black walnut, white oak, northern red oak, white ash, shortleaf pine.
						American beech------	---	---	
						White oak-----------	80	4	
						Blackgum------------	---	---	
						American sycamore---	---	---	
						Northern red oak----	---	---	
						American basswood---	---	---	
						Eastern hemlock-----	---	---	
						Bitternut hickory---	---	---	
Ra-------------- Raynham	8W	Slight	Severe	Severe	Severe	Eastern white pine--	65	8	Eastern white pine, white spruce, northern white-cedar.
						White spruce--------	55	9	
						Red spruce----------	45	7	
						Red maple-----------	---	---	
Re-------------- Red Hook	3W	Slight	Moderate	Moderate	Moderate	Red maple-----------	70	3	Eastern white pine, Norway spruce.
						Eastern white pine--	70	9	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Potential productivity: Common trees	Site index	Productivity class*	Trees to plant
RhA, RhB, RhC--- Riverhead	3A	Slight	Slight	Slight	Slight	Sugar maple--------- Northern red oak---- Black cherry-------- Eastern white pine--	63 70 70 75	3 4 3 10	Eastern white pine, Norway spruce, European larch.
SaB------------- Scio	4A	Slight	Slight	Slight	Slight	Northern red oak---- White ash----------- Sugar maple--------- Black cherry-------- Eastern hemlock----- Eastern white pine--	75 85 70 80 70 85	4 4 3 4 --- 10	European larch, eastern white pine, red pine, Norway spruce, white spruce.
ScA, ScB-------- Scriba	4W	Slight	Moderate	Moderate	Moderate	Northern red oak---- Sugar maple--------- Black cherry--------	75 60 65	4 3 3	Eastern white pine, white spruce, Norway spruce.
SeB**:									
Scriba---------	4X	Moderate	Moderate	Moderate	Moderate	Northern red oak---- Sugar maple--------- Black cherry--------	75 60 65	4 3 3	Eastern white pine, white spruce, Norway spruce.
Morris---------	3X	Slight	Moderate	Moderate	Moderate	White ash-----------	71	3	European larch.
Sn-------------- Suncook	6S	Slight	Slight	Severe	Slight	Eastern white pine-- Black oak----------- Northern red oak---- Red maple-----------	55 50 50 50	6 2 2 2	Eastern white pine, red pine.
So, Sp---------- Suny	4W	Slight	Severe	Severe	Severe	Hemlock------------- Red maple-----------	--- ---	--- ---	White spruce.
SrB, SrC-------- Swartswood	4A	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple--------- White ash-----------	70 70 70	4 3 3	Red pine, eastern white pine, Japanese larch, Norway spruce.
SrD------------- Swartswood	4R	Slight	Moderate	Slight	Slight	Northern red oak---- Sugar maple--------- White ash-----------	70 70 70	4 3 3	Red pine, eastern white pine, Japanese larch, Norway spruce.
StE**, SwE**:									
Swartswood-----	4R	Slight	Moderate	Slight	Slight	Northern red oak---- Sugar maple--------- White ash-----------	70 70 70	4 3 3	Red pine, eastern white pine, Japanese larch, Norway spruce.
Lackawanna-----	4R	Slight	Moderate	Slight	Slight	Northern red oak---- Black cherry-------- Sugar maple--------- White ash-----------	70 75 70 70	4 3 3 3	Eastern white pine, red pine, Norway spruce, European larch.

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
SwF**: Swartswood.									
Lackawanna	4R	Moderate	Severe	Slight	Slight	Northern red oak Black cherry Sugar maple White ash	70 75 70 70	4 3 3 3	Eastern white pine, red pine, Norway spruce, European larch.
TaB**: Torull	2W	Slight	Severe	Severe	Severe	Red maple American elm Eastern hemlock	55 --- 45	2 --- ---	White spruce, Norway spruce.
Rock outcrop.									
TeB**: Tuller	2W	Slight	Severe	Severe	Severe	Red maple American beech American elm Eastern hemlock	55 --- --- 45	2 --- --- ---	Eastern white pine, white spruce, Norway spruce.
Rock outcrop.									
TkA, TkB, TkC Tunkhannock	4A	Slight	Slight	Slight	Slight	Northern red oak Sugar maple	70 65	4 3	Eastern white pine, red pine, Japanese larch, Norway spruce.
TkD Tunkhannock	4R	Slight	Moderate	Slight	Slight	Northern red oak Sugar maple	70 65	4 3	Eastern white pine, red pine, Japanese larch, Norway spruce.
ToE**: Tunkhannock	4R	Slight	Moderate	Slight	Slight	Northern red oak Sugar maple	70 65	4 3	Eastern white pine, red pine, Japanese larch, Norway spruce.
Otisville	8S	Slight	Moderate	Severe	Slight	Eastern white pine Northern red oak Sugar maple White oak Black oak	65 60 55 60 60	8 3 2 3 3	Eastern white pine, European larch, red pine.
ToF**: Tunkhannock	4R	Moderate	Severe	Slight	Slight	Northern red oak Sugar maple	70 65	4 3	Eastern white pine, red pine, Japanese larch, Norway spruce.

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns: Erosion hazard	Management concerns: Equipment limitation	Management concerns: Seedling mortality	Management concerns: Windthrow hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Productivity class*	Trees to plant
ToF**:									
Otisville------	8R	Moderate	Severe	Severe	Slight	Eastern white pine--	65	8	Eastern white pine, European larch, red pine.
						Northern red oak----	60	3	
						Sugar maple---------	55	2	
						White oak-----------	60	3	
						Black oak-----------	60	3	
UnA, UnB-------- Unadilla	3A	Slight	Slight	Slight	Slight	Sugar maple---------	70	3	Eastern white pine, Norway spruce, black cherry, European larch, red pine, white spruce.
						Eastern white pine--	85	10	
						Northern red oak----	80	4	
						Black cherry--------	80	4	
						White ash-----------	95	4	
VaB, VaC-------- Valois	3A	Slight	Slight	Slight	Slight	Sugar maple---------	61	3	Eastern white pine, white spruce, Norway spruce, red pine, European larch.
						Northern red oak----	70	4	
						White ash-----------	70	3	
						American basswood---	70	3	
VaD, VaE-------- Valois	3R	Slight	Moderate	Slight	Slight	Sugar maple---------	61	3	Eastern white pine, white spruce, Norway spruce, red pine, European larch.
						Northern red oak----	70	4	
						White ash-----------	70	3	
						American basswood---	70	3	
VaF------------- Valois	3R	Moderate	Severe	Slight	Slight	Sugar maple---------	61	3	Eastern white pine, white spruce, Norway spruce, red pine, European larch.
						Northern red oak----	70	4	
						White ash-----------	70	3	
						American basswood---	70	3	
Wa-------------- Wallington	3W	Slight	Moderate	Moderate	Moderate	Northern red oak----	65	3	Eastern white pine, white spruce, Norway spruce.
						Sugar maple---------	65	3	
						White ash-----------	75	3	
Wd-------------- Wayland	3W	Slight	Severe	Severe	Severe	Red maple-----------	65	3	White spruce, northern white-cedar.
WeA, WeB, WeC--- Wellsboro	4A	Slight	Slight	Slight	Slight	Northern red oak----	78	4	Norway spruce, eastern white pine, red pine, black cherry, European larch.
						Sugar maple---------	70	3	
WlC**:									
Wellsboro------	4X	Slight	Moderate	Slight	Slight	Northern red oak----	78	4	European larch.
						Sugar maple---------	70	3	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordi-nation symbol	Management concerns: Erosion hazard	Management concerns: Equip-ment limita-tion	Management concerns: Seedling mortal-ity	Management concerns: Wind-throw hazard	Potential productivity: Common trees	Potential productivity: Site index	Potential productivity: Produc-tivity class*	Trees to plant
WlC**:									
Wurtsboro------	4X	Slight	Moderate	Slight	Slight	Northern red oak---- Sugar maple---------	70 70	4 3	Norway spruce, eastern white pine, red pine, black cherry, Japanese larch.
WmA, WmB, WmC--- Willowemoc	3A	Slight	Slight	Slight	Slight	Sugar maple--------- Yellow birch-------- Hemlock------------- American beech------ Red maple-----------	70 --- --- --- ---	3 --- --- --- ---	Black cherry, Norway spruce.
WoC------------- Willowemoc	3A	Slight	Slight	Slight	Slight	Sugar maple--------- Yellow birch-------- Hemlock------------- American beech------ Red maple-----------	70 --- --- --- ---	3 --- --- --- ---	Black cherry, Norway spruce.
WuA, WuB, WuC--- Wurtsboro	4A	Slight	Slight	Slight	Slight	Northern red oak---- Sugar maple---------	70 70	4 3	Norway spruce, eastern white pine, red pine, black cherry, Japanese larch.

* Productivity class is the yield in cubic meters per hectare per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Ad: Alden	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus, erodes easily.	Severe: ponding.
AlC*:					
Arnot	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones.	Slight	Severe: thin layer.
Lordstown	Moderate: small stones.	Moderate: small stones.	Severe: slope, small stones.	Slight	Moderate: large stones.
AlE*:					
Arnot	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones.	Severe: slope.	Severe: slope, thin layer.
Lordstown	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
AoC*:					
Arnot	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones.	Slight	Severe: thin layer.
Oquaga	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
AoE*:					
Arnot	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones.	Severe: slope.	Severe: slope, thin layer.
Oquaga	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones, slope.
ArC*:					
Arnot	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones.	Slight	Severe: thin layer.
Rock outcrop.					
ArE*, ArF*:					
Arnot	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones.	Severe: slope.	Severe: slope, thin layer.
Rock outcrop.					
Bb: Barbour	Severe: flooding.	Slight	Moderate: small stones.	Slight	Moderate: droughty.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Bs: Bash	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Ca: Carlisle	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Ce*:					
Carlisle	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Palms	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Alden	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus, erodes easily.	Severe: ponding.
ChA, ChB: Chenango	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, droughty.
ChC: Chenango	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope, droughty.
ChD: Chenango	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
CsB: Cheshire	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones.
CsC: Cheshire	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, slope.
CsD: Cheshire	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
CsE, CsF: Cheshire	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
ElB: Elka	Slight	Slight	Moderate: slope, small stones.	Slight	Slight.
ElC: Elka	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: slope.
ElD: Elka	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
ElE, ElF: Elka	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Fu*:					
Fluvaquents.					
Udifluvents.					
Gn: Greenwood	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
HaC*:					
Hawksnest	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Slight	Severe: depth to rock.
Mongaup	Slight	Slight	Severe: slope.	Slight	Moderate: droughty.
HaE*:					
Hawksnest	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Mongaup	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
HeF*:					
Hawksnest	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.
Mongaup	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.					
LaB: Lackawanna	Moderate: percs slowly.	Moderate: percs slowly.	Severe: small stones.	Slight	Moderate: small stones.
LaC: Lackawanna	Moderate: slope, small stones.	Moderate: small stones, slope.	Severe: small stones, slope.	Slight	Moderate: small stones, slope.
LaD: Lackawanna	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Moderate: slope.	Severe: slope.
LeB: Lewbeach	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight	Moderate: droughty.
LeC: Lewbeach	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Slight	Moderate: droughty, slope.
LeD: Lewbeach	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Moderate: slope.	Severe: slope.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
LfE, LfF-------------- Lewbeach	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: small stones, slope.
LoB------------------- Lordstown	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: large stones.
LrC*:					
Lordstown------------	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope, large stones, small stones.	Slight----------	Moderate: large stones, slope, thin layer.
Arnot----------------	Severe: depth to rock.	Severe: depth to rock.	Severe: large stones, slope, small stones.	Slight----------	Severe: depth to rock.
MaB------------------- Manlius	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones, droughty.
MaC------------------- Manlius	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: small stones, slope.	Slight----------	Moderate: small stones, droughty.
MaD------------------- Manlius	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Moderate: slope.	Severe: slope.
MdB------------------- Mardin	Severe: percs slowly.	Severe: percs slowly.	Severe: small stones, percs slowly.	Slight----------	Moderate: small stones.
MdC------------------- Mardin	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, small stones, percs slowly.	Slight----------	Moderate: small stones, slope.
MnB------------------- Mongaup	Moderate: large stones.	Moderate: large stones.	Severe: large stones.	Slight----------	Moderate: large stones.
MnC------------------- Mongaup	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Slight----------	Moderate: large stones, slope.
MnD------------------- Mongaup	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Moderate: slope.	Severe: slope.
MrA, MrB-------------- Morris	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
MrC------------------- Morris	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.
Ne-------------------- Neversink	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Nf*:					
Neversink	Severe: wetness.	Severe: wetness.	Severe: large stones, small stones, wetness.	Severe: wetness.	Severe: wetness, droughty.
Alden	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: large stones, excess humus, ponding.	Severe: ponding, excess humus, erodes easily.	Severe: ponding.
OaA, OaB Onteora	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
OaC Onteora	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness, droughty.
ObB Onteora	Severe: small stones, wetness.	Severe: wetness, small stones.	Severe: large stones, small stones.	Severe: wetness.	Severe: small stones, wetness, droughty.
OeB Oquaga	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.	Severe: small stones.
OgC*:					
Oquaga	Severe: small stones.	Severe: small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones.
Arnot	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones.	Slight	Severe: thin layer.
OgD*:					
Oquaga	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.	Severe: small stones, slope.
Arnot	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, small stones.	Moderate: slope.	Severe: slope, thin layer.
Os Ossipee	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
OtA, OtB Otisville	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Severe: droughty.
OtC Otisville	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Severe: droughty.
OtD Otisville	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope, droughty.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Pa------------------- Palms	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
Pe------------------- Philo	Severe: flooding.	Moderate: wetness.	Moderate: flooding, wetness.	Slight----------	Moderate: flooding.
Pg*, Ph*. Pits					
PmA, PmB------------- Pompton	Severe: flooding, wetness.	Moderate: wetness, small stones.	Severe: wetness, small stones.	Moderate: wetness.	Moderate: wetness, small stones.
Po------------------- Pope	Severe: flooding.	Slight----------	Moderate: small stones, flooding.	Severe: erodes easily.	Moderate: flooding.
Pp------------------- Pope	Severe: flooding.	Slight----------	Moderate: small stones.		Slight.
Ra------------------- Raynham	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
Re------------------- Red Hook	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
RhA------------------ Riverhead	Slight----------	Slight----------	Slight----------	Slight----------	Slight.
RhB------------------ Riverhead	Slight----------	Slight----------	Moderate: slope.	Slight----------	Slight.
RhC------------------ Riverhead	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: slope.
SaB------------------ Scio	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Moderate: erodes easily, wetness.	Moderate: wetness.
ScA, ScB------------- Scriba	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
SeB*:					
Scriba---------------	Severe: large stones, wetness.	Severe: wetness, large stones.	Severe: large stones, small stones.	Severe: wetness.	Severe: wetness, droughty.
Morris---------------	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness.	Severe: wetness.
Sn------------------- Suncook	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: droughty, flooding.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
So: Suny	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, droughty.
Sp: Suny	Severe: wetness.	Severe: wetness.	Severe: large stones, small stones, wetness.	Severe: wetness.	Severe: wetness, droughty.
SrB: Swartswood	Moderate: small stones, percs slowly.	Moderate: small stones, percs slowly.	Severe: small stones.	Slight	Moderate: droughty, large stones.
SrC: Swartswood	Moderate: wetness, small stones, slope.	Moderate: wetness, small stones, slope.	Severe: slope, small stones.	Slight	Moderate: large stones, slope.
SrD: Swartswood	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
StE*:					
Swartswood	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Lackawanna	Severe: slope.	Severe: slope.	Severe: small stones, slope.	Severe: slope.	Severe: slope.
SwE*, SwF*:					
Swartswood	Severe: slope.	Severe: slope.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope.
Lackawanna	Severe: slope, small stones.	Severe: slope, small stones.	Severe: large stones, slope, small stones.	Severe: slope.	Severe: slope.
TaB*:					
Torull	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness.	Severe: wetness.	Severe: wetness, depth to rock.
Rock outcrop.					
TeB*:					
Tuller	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: small stones, wetness.	Severe: wetness.	Severe: wetness, thin layer.
Rock outcrop.					
TkA, TkB: Tunkhannock	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Severe: small stones.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
TkC: Tunkhannock	Moderate: small stones, slope.	Moderate: small stones, slope.	Severe: slope, small stones.	Slight	Severe: small stones.
TkD: Tunkhannock	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Moderate: slope.	Severe: small stones, slope.
ToE*, ToF*:					
Tunkhannock	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope.	Severe: small stones, slope.
Otisville	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope, droughty.
Ud. Udorthents					
UnA: Unadilla	Slight	Slight	Slight	Slight	Slight.
UnB: Unadilla	Slight	Slight	Moderate: slope.	Moderate: erodes easily.	Slight.
VaB: Valois	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight	Moderate: small stones, droughty.
VaC: Valois	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight	Moderate: small stones, droughty.
VaD: Valois	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: slope.	Severe: slope.
VaE, VaF: Valois	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.	Severe: slope.
Wa: Wallington	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, erodes easily.	Severe: wetness.
Wd: Wayland	Severe: flooding, wetness, excess humus.	Severe: wetness, excess humus.	Severe: excess humus, wetness, flooding.	Severe: wetness, excess humus.	Severe: wetness, flooding.
WeA, WeB: Wellsboro	Moderate: percs slowly, wetness.	Moderate: wetness, percs slowly.	Severe: small stones.	Severe: slope.	Moderate: large stones.
WeC: Wellsboro	Moderate: slope, percs slowly, wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope, small stones.	Severe: slope.	Moderate: slope, large stones.

See footnote at end of table.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
WlC*:					
Wellsboro	Severe: large stones.	Severe: large stones.	Severe: slope.	Moderate: wetness.	Moderate: large stones.
Wurtsboro	Severe: large stones.	Severe: large stones.	Severe: large stones, slope, small stones.	Moderate: wetness.	Moderate: small stones, large stones.
WmA, WmB Willowemoc	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Moderate: wetness.	Moderate: wetness, droughty.
WmC Willowemoc	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, percs slowly.	Moderate: wetness.	Moderate: wetness, droughty.
WoC Willowemoc	Severe: small stones.	Severe: small stones.	Severe: large stones, slope, small stones.	Moderate: wetness.	Severe: small stones, droughty.
WuA, WuB Wurtsboro	Moderate: large stones, wetness.	Moderate: wetness, large stones.	Severe: small stones.	Moderate: wetness.	Moderate: wetness, large stones.
WuC Wurtsboro	Moderate: large stones, slope.	Moderate: wetness, large stones, slope.	Severe: slope, small stones.	Moderate: wetness.	Moderate: large stones, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
Ad----------------- Alden	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
AlC*:										
Arnot--------------	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Lordstown----------	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
AlE*:										
Arnot--------------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Lordstown----------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
AoC*:										
Arnot--------------	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Oquaga-------------	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
AoE*:										
Arnot--------------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Oquaga-------------	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
ArC*:										
Arnot--------------	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.										
ArE*, ArF*:										
Arnot--------------	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.										
Bb----------------- Barbour	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Bs----------------- Bash	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Ca----------------- Carlisle	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Ce*:										
Carlisle-----------	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Palms--------------	Good	Poor	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
Ce*:										
Alden	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
ChA, ChB, ChC Chenango	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
ChD Chenango	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
CsB Cheshire	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
CsC Cheshire	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
CsD Cheshire	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CsE Cheshire	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
CsF Cheshire	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
ElB Elka	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ElC Elka	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
ElD Elka	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
ElE Elka	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
ElF Elka	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Fu*:										
Fluvaquents.										
Udifluvents.										
Gn Greenwood	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
HaC*:										
Hawksnest	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Mongaup	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
HaE*:										
Hawksnest	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
HaE*:										
Mongaup	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
HeF*:										
Hawksnest	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Mongaup	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Fair	Very poor.
Rock outcrop.										
LaB Lackawanna	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LaC Lackawanna	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LaD Lackawanna	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
LeB Lewbeach	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LeC Lewbeach	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
LeD Lewbeach	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
LfE Lewbeach	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
LfF Lewbeach	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
LoB Lordstown	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
LrC*:										
Lordstown	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Arnot	Very poor.	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
MaB Manlius	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
MaC Manlius	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
MaD Manlius	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
MdB Mardin	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
MdC----------------- Mardin	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
MnB----------------- Mongaup	Very poor.	Very poor.	Good	Good	Good	Poor	Very poor.	Poor	Good	Very poor.
MnC, MnD----------- Mongaup	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
MrA----------------- Morris	Fair	Good	Good	Fair	Fair	Fair	Fair	Good	Fair	Fair.
MrB----------------- Morris	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
MrC----------------- Morris	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Ne------------------ Neversink	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Nf*:										
Neversink----------	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Alden--------------	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
OaA----------------- Onteora	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
OaB----------------- Onteora	Fair	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Poor.
OaC----------------- Onteora	Fair	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
ObB----------------- Onteora	Very poor.	Poor	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
OeB----------------- Oquaga	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
OgC*:										
Oquaga------------	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Arnot-------------	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
OgD*:										
Oquaga------------	Poor	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Arnot-------------	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Os------------------ Ossipee	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
OtA, OtB, OtC, OtD-- Otisville	Poor	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Pa-- Palms	Good	Poor	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
Pe-- Philo	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
Pg*, Ph*. Pits										
PmA-- Pompton	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
PmB-- Pompton	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Po, Pp-- Pope	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Ra-- Raynham	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
Re-- Red Hook	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
RhA-- Riverhead	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
RhB, RhC-- Riverhead	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
SaB-- Scio	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
ScA-- Scriba	Fair	Fair	Fair	Poor	Poor	Fair	Fair	Fair	Poor	Fair.
ScB-- Scriba	Fair	Fair	Fair	Poor	Poor	Poor	Very poor.	Fair	Poor	Very poor.
SeB*:										
Scriba--	Very poor.	Very poor.	Fair	Poor	Poor	Poor	Very poor.	Poor	Poor	Very poor.
Morris--	Very poor.	Very poor.	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
Sn-- Suncook	Poor	Poor	Fair	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
So, Sp-- Suny	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
SrB-- Swartswood	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
SrC-- Swartswood	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife
SrD----------------- Swartswood	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
StE*:										
Swartswood--------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Lackawanna--------	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
SwE*:										
Swartswood--------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Lackawanna--------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
SwF*:										
Swartswood--------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Lackawanna--------	Very poor.	Very poor.	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
TaB*:										
Torull------------	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.
Rock outcrop.										
TeB*:										
Tuller------------	Very poor.	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.
Rock outcrop.										
TkA, TkB, TkC------ Tunkhannock	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
TkD---------------- Tunkhannock	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
ToE*:										
Tunkhannock-------	Very poor.	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Otisville---------	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
ToF*:										
Tunkhannock-------	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Otisville---------	Very poor.	Poor	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.
Ud. Udorthents										
UnA, UnB----------- Unadilla	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 10.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
VaB----------------- Valois	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
VaC----------------- Valois	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
VaD----------------- Valois	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
VaE----------------- Valois	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
VaF----------------- Valois	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Wa------------------ Wallington	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Wd------------------ Wayland	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
WeA----------------- Wellsboro	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor.
WeB----------------- Wellsboro	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
WeC----------------- Wellsboro	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
WlC*:										
Wellsboro----------	Very poor.	Very poor.	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
Wurtsboro----------	Very poor.	Very poor.	Good	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
WmA----------------- Willowemoc	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor.
WmB----------------- Willowemoc	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
WmC----------------- Willowemoc	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
WoC----------------- Willowemoc	Very poor.	Poor	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
WuA----------------- Wurtsboro	Fair	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor.
WuB----------------- Wurtsboro	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
WuC----------------- Wurtsboro	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ad: Alden	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
AlC*:						
Arnot	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: thin layer.
Lordstown	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Moderate: large stones.
AlE*:						
Arnot	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, thin layer.
Lordstown	Severe: slope, depth to rock.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
AoC*:						
Arnot	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: thin layer.
Oquaga	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Severe: small stones.
AoE*:						
Arnot	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, thin layer.
Oquaga	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
ArC*:						
Arnot	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: thin layer.
Rock outcrop.						
ArE*, ArF*:						
Arnot	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, thin layer.
Rock outcrop.						
Bb: Barbour	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Moderate: droughty.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Bs-----------------Bash	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, flooding, frost action.	Severe: wetness.
Ca-----------------Carlisle	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, frost action, subsides.	Severe: ponding, excess humus.
Ce*:						
Carlisle----------	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, frost action, subsides.	Severe: ponding, excess humus.
Palms-------------	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, frost action, subsides.	Severe: ponding, excess humus.
Alden-------------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
ChA----------------Chenango	Severe: cutbanks cave.	Slight----------	Slight----------	Slight----------	Moderate: frost action.	Moderate: small stones, droughty.
ChB----------------Chenango	Severe: cutbanks cave.	Slight----------	Slight----------	Moderate: slope.	Moderate: frost action.	Moderate: small stones, droughty.
ChC----------------Chenango	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, slope, droughty.
ChD----------------Chenango	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
CsB----------------Cheshire	Slight----------	Slight----------	Slight----------	Moderate: slope.	Slight----------	Moderate: small stones.
CsC----------------Cheshire	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: small stones, slope.
CsD, CsE, CsF------Cheshire	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
ElB----------------Elka	Slight----------	Slight----------	Slight----------	Moderate: slope.	Moderate: frost action.	Slight.
ElC----------------Elka	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
ElD, ElE, ElF------Elka	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Fu*: Fluvaquents.						
Udifluvents.						
Gn: Greenwood	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, frost action, subsides.	Severe: ponding, excess humus.
HaC*: Hawksnest	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
Mongaup	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Moderate: droughty.
HaE*: Hawksnest	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Mongaup	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
HeF*: Hawksnest	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.
Mongaup	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.						
LaB: Lackawanna	Moderate: wetness.	Slight	Moderate: wetness.	Slight	Moderate: frost action.	Moderate: small stones.
LaC: Lackawanna	Moderate: wetness, slope.	Moderate: slope.	Moderate: wetness, slope.	Moderate: slope.	Moderate: frost action, slope.	Moderate: small stones, slope.
LaD: Lackawanna	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
LeB: Lewbeach	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: droughty.
LeC: Lewbeach	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: wetness, slope, frost action.	Moderate: droughty, slope.
LeD: Lewbeach	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
LfE, LfF: Lewbeach	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
LoB: Lordstown	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Moderate: large stones.
LrC*:						
Lordstown	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Moderate: large stones, slope, thin layer.
Arnot	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.
MaB: Manlius	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Moderate: small stones, droughty.
MaC: Manlius	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, frost action.	Moderate: small stones, droughty.
MaD: Manlius	Severe: depth to rock, slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
MdB: Mardin	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Moderate: frost action, wetness.	Moderate: small stones.
MdC: Mardin	Severe: wetness.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Moderate: slope, frost action, wetness.	Moderate: small stones, slope.
MnB: Mongaup	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Moderate: large stones.
MnC: Mongaup	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope, frost action.	Moderate: large stones, slope.
MnD: Mongaup	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: slope.
MrA, MrB: Morris	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.
MrC: Morris	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: slope, wetness.	Severe: frost action, wetness.	Severe: wetness.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Ne: Neversink	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, droughty.
Nf*:						
Neversink	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, droughty.
Alden	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
OaA, OaB: Onteora	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, droughty.
OaC: Onteora	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, slope.	Severe: wetness, frost action.	Severe: wetness, droughty.
ObB: Onteora	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: small stones, wetness, droughty.
OeB: Oquaga	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock, frost action.	Severe: small stones.
OgC*:						
Oquaga	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: slope, depth to rock, frost action.	Severe: small stones.
Arnot	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer.
OgD*:						
Oquaga	Severe: depth to rock, slope.	Severe: slope.	Severe: depth to rock, slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Arnot	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, thin layer.
Os: Ossipee	Severe: excess humus, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: frost action, ponding.	Severe: ponding, excess humus.
OtA: Otisville	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: droughty.
OtB: Otisville	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Severe: droughty.
OtC: Otisville	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
OtD: Otisville	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
Pa: Palms	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, frost action, subsides.	Severe: ponding, excess humus.
Pe: Philo	Severe: cutbanks cave, wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Pg*, Ph*. Pits						
PmA, PmB: Pompton	Severe: cutbanks cave, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: frost action.	Moderate: wetness, small stones.
Po: Pope	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Pp: Pope	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding, frost action.	Slight.
Ra: Raynham	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.
Re: Red Hook	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: wetness, frost action.	Severe: wetness.
RhA: Riverhead	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Slight.
RhB: Riverhead	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: frost action.	Slight.
RhC: Riverhead	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
SaB: Scio	Severe: wetness, cutbanks cave.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Moderate: wetness.
ScA, ScB: Scriba	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, droughty.
SeB*: Scriba	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, droughty.
Morris	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action, wetness.	Severe: wetness.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
Sn: Suncook	Severe: cutbanks cave.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: droughty, flooding.
So, Sp: Suny	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, droughty.
SrB: Swartswood	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: droughty, large stones.
SrC: Swartswood	Moderate: wetness, slope.	Moderate: wetness, slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: wetness, slope, frost action.	Moderate: large stones, slope.
SrD: Swartswood	Severe: slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope.	Severe: slope.
StE*:						
Swartswood	Severe: slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lackawanna	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
SwE*, SwF*:						
Swartswood	Severe: wetness, slope.	Severe: slope.	Severe: wetness, slope.	Severe: slope.	Severe: slope.	Severe: slope.
Lackawanna	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
TaB*:						
Torull	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: depth to rock, wetness, frost action.	Severe: wetness, depth to rock.
Rock outcrop.						
TeB*:						
Tuller	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness, frost action.	Severe: wetness, thin layer.
Rock outcrop.						
TkA: Tunkhannock	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: small stones.
TkB: Tunkhannock	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Severe: small stones.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
TkC: Tunkhannock	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: small stones.
TkD: Tunkhannock	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
ToE*, ToF*:						
Tunkhannock	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: small stones, slope.
Otisville	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, droughty.
Ud. Udorthents						
UnA: Unadilla	Severe: cutbanks cave.	Slight	Slight	Slight	Severe: frost action.	Slight.
UnB: Unadilla	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Severe: frost action.	Slight.
VaB: Valois	Slight	Slight	Slight	Moderate: slope.	Moderate: frost action.	Moderate: small stones, droughty.
VaC: Valois	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: small stones, droughty.
VaD, VaE, VaF: Valois	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Wa: Wallington	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness.
Wd: Wayland	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
WeA: Wellsboro	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: frost action.	Moderate: large stones.
WeB: Wellsboro	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Severe: frost action.	Moderate: large stones.
WeC: Wellsboro	Severe: wetness.	Moderate: slope, wetness.	Severe: wetness.	Severe: slope.	Severe: frost action.	Moderate: slope, large stones.
WlC*:						
Wellsboro	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Severe: frost action.	Moderate: large stones.

See footnote at end of table.

TABLE 11.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
WlC*:						
Wurtsboro	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: small stones, large stones.
WmA Willowemoc	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Severe: frost action.	Moderate: wetness, droughty.
WmB Willowemoc	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Severe: frost action.	Moderate: wetness, droughty.
WmC Willowemoc	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Severe: frost action.	Moderate: wetness, droughty.
WoC Willowemoc	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Severe: frost action.	Severe: small stones, droughty.
WuA Wurtsboro	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, frost action.	Moderate: wetness, large stones.
WuB Wurtsboro	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness, frost action.	Moderate: wetness, large stones.
WuC Wurtsboro	Severe: wetness.	Moderate: wetness, slope.	Severe: wetness.	Severe: slope.	Moderate: wetness, slope, frost action.	Moderate: large stones, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ad: Alden	Severe: ponding, percs slowly.	Slight	Severe: ponding.	Severe: ponding.	Poor: ponding.
AlC*:					
Arnot	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
Lordstown	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
AlE*:					
Arnot	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Lordstown	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Poor: area reclaim, slope, small stones.
AoC*:					
Arnot	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
Oquaga	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
AoE*:					
Arnot	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Oquaga	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
ArC*:					
Arnot	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
Rock outcrop.					

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
ArE*, ArF*:					
Arnot	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Rock outcrop.					
Bb: Barbour	Severe: poor filter, wetness.	Severe: flooding, seepage, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, too sandy, small stones.
Bs: Bash	Severe: flooding, wetness, percs slowly.	Severe: seepage, flooding, wetness.	Severe: flooding, seepage, wetness.	Severe: flooding, wetness.	Poor: small stones, wetness.
Ca: Carlisle	Severe: ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Ce*:					
Carlisle	Severe: ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Palms	Severe: subsides, ponding.	Severe: seepage, excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, seepage.	Poor: ponding, excess humus.
Alden	Severe: ponding, percs slowly.	Slight	Severe: ponding.	Severe: ponding.	Poor: ponding.
ChA, ChB: Chenango	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
ChC: Chenango	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
ChD: Chenango	Severe: poor filter, slope.	Severe: slope, seepage.	Severe: slope, seepage, too sandy.	Severe: slope, seepage.	Poor: seepage, too sandy, small stones.
CsB: Cheshire	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.
CsC: Cheshire	Moderate: slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: small stones, slope.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
CsD, CsE, CsF: Cheshire	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: slope.
ElB: Elka	Moderate: percs slowly.	Moderate: seepage, slope.	Slight	Slight	Fair: small stones.
ElC: Elka	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: small stones, slope.
ElD, ElE, ElF: Elka	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Fu*: Fluvaquents.					
Udifluvents.					
Gn: Greenwood	Severe: ponding.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
HaC*: Hawksnest	Severe: depth to rock.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: depth to rock, small stones.
Mongaup	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
HaE*: Hawksnest	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Mongaup	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
HeF*: Hawksnest	Severe: depth to rock, slope.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: depth to rock, small stones, slope.
Mongaup	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
Rock outcrop.					

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
LaB----------------- Lackawanna	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: wetness.	Moderate: wetness.	Poor: small stones.
LaC----------------- Lackawanna	Severe: percs slowly.	Severe: slope.	Moderate: wetness, slope.	Moderate: wetness, slope.	Poor: small stones.
LaD----------------- Lackawanna	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
LeB----------------- Lewbeach	Severe: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Poor: seepage, small stones.
LeC----------------- Lewbeach	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, slope.	Moderate: wetness, slope.	Poor: seepage, small stones.
LeD, LfE, LfF------- Lewbeach	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Poor: seepage, small stones, slope.
LoB----------------- Lordstown	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
LrC*:					
Lordstown----------	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
Arnot--------------	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
MaB----------------- Manlius	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, seepage, small stones.
MaC----------------- Manlius	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, seepage, small stones.
MaD----------------- Manlius	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Poor: area reclaim, seepage, small stones.
MdB----------------- Mardin	Severe: percs slowly, wetness.	Moderate: slope, seepage.	Severe: wetness.	Moderate: wetness.	Poor: small stones.
MdC----------------- Mardin	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: slope, wetness.	Poor: small stones.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
MnB: Mongaup	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
MnC: Mongaup	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: depth to rock, small stones.
MnD: Mongaup	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, small stones, slope.
MrA: Morris	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Severe: wetness.	Poor: wetness, small stones.
MrB: Morris	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness, small stones.
MrC: Morris	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness, small stones.
Ne: Neversink	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
Nf*:					
Neversink	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
Alden	Severe: ponding, percs slowly.	Slight	Severe: ponding.	Severe: ponding.	Poor: ponding.
OaA, OaB: Onteora	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
OaC: Onteora	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
ObB: Onteora	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
OeB: Oquaga	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
OgC*:					
Oquaga	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
OgC*:					
Arnot	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones.
OgD*:					
Oquaga	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Arnot	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, small stones, slope.
Os Ossipee	Severe: ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: ponding.	Severe: seepage, ponding.	Poor: ponding.
OtA, OtB Otisville	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
OtC Otisville	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
OtD Otisville	Severe: poor filter, slope.	Severe: slope, seepage.	Severe: slope, seepage, too sandy.	Severe: slope, seepage.	Poor: seepage, too sandy, small stones.
Pa Palms	Severe: subsides, ponding.	Severe: seepage, excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, seepage.	Poor: ponding, excess humus.
Pe Philo	Severe: flooding, wetness, poor filter.	Severe: flooding, wetness, seepage.	Severe: flooding, depth to rock, seepage.	Severe: flooding, wetness.	Fair: area reclaim, wetness, thin layer.
Pg*, Ph*. Pits					
PmA, PmB Pompton	Severe: wetness, poor filter.	Severe: seepage, flooding.	Severe: seepage, wetness.	Severe: seepage, wetness.	Poor: seepage, small stones, wetness.
Po Pope	Severe: flooding.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Good.
Pp Pope	Moderate: flooding, percs slowly.	Severe: seepage, flooding.	Severe: seepage.	Severe: seepage.	Good.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
Ra-------------------- Raynham	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Re-------------------- Red Hook	Severe: wetness, percs slowly.	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
RhA, RhB------------- Riverhead	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
RhC------------------ Riverhead	Severe: poor filter.	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
SaB------------------ Scio	Severe: wetness, poor filter.	Severe: seepage.	Severe: seepage, wetness.	Severe: wetness.	Fair: wetness, thin layer.
ScA------------------ Scriba	Severe: wetness, percs slowly.	Slight-----------	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
ScB------------------ Scriba	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
SeB*:					
Scriba--------------	Severe: wetness, percs slowly.	Moderate: slope, large stones.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
Morris--------------	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Sn-------------------- Suncook	Severe: flooding, poor filter.	Severe: flooding, seepage.	Severe: flooding, seepage, wetness.	Severe: flooding, seepage.	Poor: seepage, too sandy.
So, Sp--------------- Suny	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: small stones, wetness.
SrB------------------ Swartswood	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: wetness.	Moderate: wetness.	Poor: seepage, small stones, thin layer.
SrC------------------ Swartswood	Severe: percs slowly.	Severe: slope.	Moderate: wetness, slope.	Moderate: wetness, slope.	Poor: seepage, small stones, thin layer.
SrD------------------ Swartswood	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: seepage, small stones, slope.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
StE*, SwE*, SwF*:					
Swartswood	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: seepage, small stones, slope.
Lackawanna	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
TaB*:					
Torull	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: depth to rock, wetness.
Rock outcrop.					
TeB*:					
Tuller	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Severe: depth to rock, wetness.	Poor: area reclaim, wetness, small stones.
Rock outcrop.					
TkA, TkB Tunkhannock	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
TkC Tunkhannock	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
TkD Tunkhannock	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
ToE*, ToF*:					
Tunkhannock	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Otisville	Severe: poor filter, slope.	Severe: slope, seepage.	Severe: slope, seepage, too sandy.	Severe: slope, seepage.	Poor: seepage, too sandy, small stones.
Ud. Udorthents					
UnA, UnB Unadilla	Slight	Severe: seepage.	Severe: seepage.	Slight	Fair: thin layer.
VaB Valois	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Poor: small stones.

See footnote at end of table.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
VaC: Valois	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Poor: small stones.
VaD, VaE, VaF: Valois	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope.	Severe: seepage, slope.	Poor: small stones, slope.
Wa: Wallington	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Wd: Wayland	Severe: flooding, wetness, percs slowly.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
WeA: Wellsboro	Severe: percs slowly, wetness.	Slight	Severe: wetness.	Moderate: wetness.	Poor: small stones.
WeB: Wellsboro	Severe: percs slowly, wetness.	Moderate: slope.	Severe: wetness.	Moderate: wetness.	Poor: small stones.
WeC: Wellsboro	Severe: percs slowly, wetness.	Severe: slope.	Severe: wetness.	Moderate: slope, wetness.	Poor: small stones.
WlC*:					
Wellsboro	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Moderate: wetness.	Poor: small stones.
Wurtsboro	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Severe: wetness.	Poor: thin layer, small stones.
WmA, WmB: Willowemoc	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Moderate: wetness.	Poor: small stones.
WmC, WoC: Willowemoc	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness.	Moderate: wetness, slope.	Poor: small stones.
WuA: Wurtsboro	Severe: wetness, percs slowly.	Moderate: small stones.	Severe: wetness.	Severe: wetness.	Poor: small stones, thin layer.
WuB: Wurtsboro	Severe: wetness, percs slowly.	Moderate: small stones, slope.	Severe: wetness.	Severe: wetness.	Poor: small stones, thin layer.
WuC: Wurtsboro	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Severe: wetness.	Poor: small stones, thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Ad: Alden	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, small stones, area reclaim.
AlC*:				
Arnot	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Lordstown	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
AlE*:				
Arnot	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Lordstown	Poor: slope, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, small stones.
AoC*:				
Arnot	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Oquaga	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
AoE*:				
Arnot	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Oquaga	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
ArC*:				
Arnot	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
Rock outcrop.				
ArE*, ArF*:				
Arnot	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Rock outcrop.				

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Bb: Barbour	Good	Probable	Probable	Poor: small stones, area reclaim.
Bs: Bash	Poor: wetness.	Probable	Probable	Poor: small stones, area reclaim, wetness.
Ca: Carlisle	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
Ce*:				
Carlisle	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
Palms	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess humus.
Alden	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, small stones, area reclaim.
ChA, ChB, ChC: Chenango	Good	Probable	Probable	Poor: small stones, area reclaim.
ChD: Chenango	Fair: slope.	Probable	Probable	Poor: slope, small stones, area reclaim.
CsB: Cheshire	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
CsC: Cheshire	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, slope.
CsD: Cheshire	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
CsE, CsF: Cheshire	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
ElB, ElC: Elka	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
ElD: Elka	Fair: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
ElE, ElF: Elka	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
Fu*:				
Fluvaquents.				
Udifluvents.				
Gn------------------ Greenwood	Poor: wetness, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
HaC*:				
Hawksnest-----------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
Mongaup-------------	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
HaE*:				
Hawksnest-----------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Mongaup-------------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
HeF*:				
Hawksnest-----------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, slope.
Mongaup-------------	Poor: depth to rock, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Rock outcrop.				
LaB, LaC------------- Lackawanna	Fair: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
LaD------------------ Lackawanna	Fair: thin layer, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
LeB, LeC------------- Lewbeach	Fair: wetness.	Improbable: small stones.	Probable------------	Poor: small stones, area reclaim.
LeD------------------ Lewbeach	Fair: wetness, slope.	Improbable: small stones.	Probable------------	Poor: small stones, area reclaim, slope.
LfE, LfF------------- Lewbeach	Poor: slope.	Improbable: small stones.	Probable------------	Poor: small stones, area reclaim, slope.

See footnote at end of table.

TABLE 13.-CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
LoB: Lordstown	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
LrC*:				
Lordstown	Poor: thin layer, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Arnot	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones.
MaB, MaC: Manlius	Poor: area reclaim.	Improbable: small stones, excess fines.	Improbable: thin layer, excess fines.	Poor: small stones, area reclaim.
MaD: Manlius	Poor: area reclaim.	Improbable: small stones, excess fines.	Improbable: thin layer, excess fines.	Poor: small stones, slope, area reclaim.
MdB, MdC: Mardin	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
MnB, MnC: Mongaup	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
MnD: Mongaup	Poor: depth to rock.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
MrA, MrB, MrC: Morris	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Ne: Neversink	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
Nf*:				
Neversink	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
Alden	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, small stones, area reclaim.
OaA, OaB, OaC, ObB: Onteora	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, wetness.
OeB: Oquaga	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
OgC*:				
Oquaga	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Arnot	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones.
OgD*:				
Oquaga	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Arnot	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Os Ossipee	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
OtA, OtB, OtC Otisville	Good	Probable	Probable	Poor: small stones, area reclaim.
OtD Otisville	Fair: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
Pa Palms	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, excess humus.
Pe Philo	Fair: area reclaim, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, area reclaim.
Pg*, Ph*. Pits				
PmA, PmB Pompton	Fair: wetness.	Probable	Probable	Poor: small stones, area reclaim.
Po, Pp Pope	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
Ra Raynham	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Re Red Hook	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
RhA, RhB, RhC Riverhead	Good	Probable	Probable	Poor: small stones.

See footnote at end of table.

TABLE 13.-CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
SaB: Scio	Fair: wetness.	Probable	Probable	Fair: area reclaim.
ScA, ScB: Scriba	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
SeB*:				
Scriba	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
Morris	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Sn: Suncook	Good	Probable	Probable	Poor: too sandy.
So, Sp: Suny	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, wetness.
SrB, SrC: Swartswood	Fair: wetness, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
SrD: Swartswood	Fair: wetness, slope, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
StE*, SwE*, SwF*:				
Swartswood	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
Lackawanna	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
TaB*:				
Torull	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, wetness.
Rock outcrop.				
TeB*:				
Tuller	Poor: area reclaim, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, wetness.
Rock outcrop.				

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
TkA, TkB, TkC: Tunkhannock	Fair: large stones.	Probable	Probable	Poor: small stones, area reclaim.
TkD: Tunkhannock	Fair: large stones, slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
ToE*, ToF*:				
Tunkhannock	Poor: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
Otisville	Poor: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
Ud. Udorthents				
UnA, UnB: Unadilla	Good	Probable	Probable	Moderate: area reclaim.
VaB, VaC: Valois	Good	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
VaD: Valois	Fair: slope.	Improbable: small stones.	Probable	Poor: small stones, area reclaim, slope.
VaE, VaF: Valois	Poor: slope.	Improbable: small stones.	Probable	Poor: small stones, area reclaim, slope.
Wa: Wallington	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
Wd: Wayland	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
WeA, WeB, WeC: Wellsboro	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
WlC*:				
Wellsboro	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
Wurtsboro	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

See footnote at end of table.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
WmA, WmB, WmC, WoC----Willowemoc	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
WuA, WuB, WuC---------Wurtsboro	Poor: thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
Ad: Alden	Slight	Severe: piping, wetness.	Slight	Percs slowly, frost action.	Erodes easily, wetness.	Wetness, erodes easily, rooting depth.
AlC*:						
Arnot	Severe: depth to rock.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, depth to rock.	Large stones, droughty.
Lordstown	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Depth to rock	Droughty, depth to rock.
AlE*:						
Arnot	Severe: depth to rock, slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, slope, depth to rock.	Large stones, slope, droughty.
Lordstown	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock.
AoC*:						
Arnot	Severe: depth to rock.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, depth to rock.	Large stones, droughty.
Oquaga	Moderate: seepage, depth to rock, slope.	Severe: seepage, piping, thin layer.	Severe: no water.	Deep to water	Large stones, depth to rock.	Large stones, droughty.
AoE*:						
Arnot	Severe: depth to rock, slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, slope, depth to rock.	Large stones, slope, droughty.
Oquaga	Severe: slope.	Severe: seepage, piping, thin layer.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
ArC*:						
Arnot	Severe: depth to rock.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, depth to rock.	Large stones, droughty.
Rock outcrop.						
ArE*, ArF*:						
Arnot	Severe: depth to rock, slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, slope, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
Bb------------------ Barbour	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Too sandy------	Droughty.
Bs------------------ Bash	Moderate: seepage.	Severe: seepage, piping, wetness.	Severe: slow refill, cutbanks cave.	Flooding, frost action.	Wetness--------	Wetness.
Ca------------------ Carlisle	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, subsides, frost action.	Ponding, soil blowing.	Wetness.
Ce*:						
Carlisle----------	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, subsides, frost action.	Ponding, soil blowing.	Wetness.
Palms-------------	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, subsides, frost action.	Ponding, soil blowing.	Wetness.
Alden-------------	Slight----------	Severe: piping, wetness.	Slight----------	Percs slowly, frost action.	Erodes easily, wetness.	Wetness, erodes easily, rooting depth.
ChA, ChB---------- Chenango	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Too sandy------	Droughty.
ChC, ChD---------- Chenango	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
CsB--------------- Cheshire	Severe: seepage.	Moderate: seepage, piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
CsC, CsD, CsE, CsF-------------- Cheshire	Severe: seepage, slope.	Moderate: seepage, piping.	Severe: no water.	Deep to water	Slope, erodes easily.	Slope, erodes easily.
ElB--------------- Elka	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Favorable------	Favorable.
ElC, ElD, ElE, ElF-------------- Elka	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope----------	Slope.
Fu*: Fluvaquents.						
Udifluvents.						
Gn---------------- Greenwood	Severe: seepage.	Severe: excess humus, ponding.	Moderate: slow refill.	Ponding, frost action.	Ponding--------	Wetness.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
HaC*:						
Hawksnest	Severe: depth to rock.	Severe: piping.	Severe: no water.	Deep to water	Depth to rock	Droughty, depth to rock.
Mongaup	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Depth to rock	Droughty, depth to rock.
HaE*:						
Hawksnest	Severe: depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock.
Mongaup	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock.
HeF*:						
Hawksnest	Severe: depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock.
Mongaup	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock.
Rock outcrop.						
LaB Lackawanna	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Rooting depth, percs slowly.	Rooting depth, percs slowly.
LaC, LaD Lackawanna	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Slope, rooting depth, percs slowly.	Slope, rooting depth, percs slowly.
LeB Lewbeach	Moderate: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Percs slowly, slope.	Wetness, rooting depth.	Droughty, rooting depth.
LeC, LeD, LfE, LfF Lewbeach	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Percs slowly, slope.	Slope, wetness, rooting depth.	Slope, droughty, rooting depth.
LoB Lordstown	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Depth to rock	Droughty, depth to rock.
LrC*:						
Lordstown	Severe: slope.	Severe: piping, thin layer.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, depth to rock.
Arnot	Severe: depth to rock, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
MaB-- Manlius	Moderate: seepage, depth to rock, slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, depth to rock.	Droughty, large stones, depth to rock.
MaC, MaD-- Manlius	Severe: slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Slope, droughty, large stones.
MdB-- Mardin	Moderate: slope.	Moderate: piping.	Severe: no water.	Slope, percs slowly.	Wetness, rooting depth, percs slowly.	Wetness, rooting depth, percs slowly.
MdC-- Mardin	Severe: slope.	Moderate: piping.	Severe: no water.	Slope, percs slowly.	Slope, wetness, rooting depth.	Slope, wetness, rooting depth.
MnB-- Mongaup	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Depth to rock	Droughty, depth to rock.
MnC, MnD-- Mongaup	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, depth to rock.	Slope, droughty, depth to rock.
MrA-- Morris	Slight--	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action.	Percs slowly, wetness, rooting depth.	Wetness, rooting depth, percs slowly.
MrB-- Morris	Moderate: slope.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Percs slowly, wetness, rooting depth.	Wetness, rooting depth, percs slowly.
MrC-- Morris	Severe: slope.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Percs slowly, wetness, slope.	Wetness, rooting depth, slope.
Ne-- Neversink	Slight--	Severe: seepage, piping, wetness.	Severe: no water.	Percs slowly, frost action.	Wetness, percs slowly.	Wetness, droughty, rooting depth.
Nf*:						
Neversink--	Slight--	Severe: seepage, piping, wetness.	Severe: no water.	Percs slowly, frost action.	Wetness, percs slowly.	Wetness, droughty, rooting depth.
Alden--	Slight--	Severe: piping, wetness.	Slight--	Percs slowly, frost action.	Wetness, erodes easily.	Wetness, rooting depth, erodes easily.
OaA-- Onteora	Slight--	Severe: seepage, piping, wetness.	Severe: no water.	Percs slowly, frost action.	Wetness, rooting depth.	Wetness, droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
OaB: Onteora	Moderate: slope.	Severe: seepage, piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, rooting depth.	Wetness, droughty.
OaC: Onteora	Severe: slope.	Severe: seepage, piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, rooting depth.	Wetness, slope, droughty.
ObB: Onteora	Moderate: slope.	Severe: seepage, piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Wetness	Wetness.
OeB: Oquaga	Moderate: seepage, depth to rock, slope.	Severe: seepage, piping, thin layer.	Severe: no water.	Deep to water	Large stones, depth to rock.	Large stones, droughty.
OgC*, OgD*:						
Oquaga	Severe: slope.	Severe: seepage, piping, thin layer.	Severe: no water.	Deep to water	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Arnot	Severe: depth to rock, slope.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, slope, depth to rock.	Large stones, slope, droughty.
Os: Ossipee	Severe: seepage.	Severe: piping, ponding.	Severe: slow refill.	Ponding, frost action, subsides.	Ponding	Wetness.
OtA, OtB: Otisville	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Too sandy	Droughty.
OtC, OtD: Otisville	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
Pa: Palms	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, subsides, frost action.	Ponding, soil blowing.	Wetness.
Pe: Philo	Severe: seepage.	Severe: piping.	Moderate: deep to water.	Flooding	Wetness	Favorable.
Pg*, Ph*. Pits						
PmA: Pompton	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Frost action, cutbanks cave.	Wetness, too sandy.	Wetness.
PmB: Pompton	Severe: seepage.	Severe: seepage, wetness.	Severe: cutbanks cave.	Frost action, slope, cutbanks cave.	Wetness, too sandy.	Wetness.
Po: Pope	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
Pp----------------- Pope	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water		
Ra----------------- Raynham	Slight---------	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, frost action.	Wetness, percs slowly, erodes easily.	Wetness, percs slowly, erodes easily.
Re----------------- Red Hook	Moderate: seepage.	Severe: wetness, seepage, piping.	Severe: slow refill.	Frost action---	Wetness--------	Wetness.
RhA, RhB----------- Riverhead	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Too sandy------	Favorable.
RhC---------------- Riverhead	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope.
SaB---------------- Scio	Moderate: seepage, slope.	Severe: piping, wetness.	Severe: cutbanks cave.	Slope, cutbanks cave, frost action.	Erodes easily, wetness.	Erodes easily.
ScA---------------- Scriba	Slight---------	Severe: seepage, piping, wetness.	Severe: no water.	Percs slowly---	Wetness, rooting depth.	Wetness, droughty.
ScB---------------- Scriba	Moderate: slope.	Severe: seepage, piping, wetness.	Severe: no water.	Percs slowly, slope.	Wetness, rooting depth.	Wetness, droughty.
SeB*: Scriba------------	Moderate: slope.	Severe: seepage, piping, wetness.	Severe: no water.	Percs slowly, slope.	Wetness, rooting depth.	Wetness, droughty.
Morris------------	Moderate: slope.	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action, slope.	Percs slowly, wetness, large stones.	Percs slowly, wetness, large stones.
Sn----------------- Suncook	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Deep to water	Too sandy------	Droughty.
So, Sp------------- Suny	Slight---------	Severe: seepage, piping, wetness.	Severe: no water.	Percs slowly, frost action.	Wetness, percs slowly.	Wetness, droughty, rooting depth.
SrB---------------- Swartswood	Moderate: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Percs slowly, slope.	Slope, rooting depth, percs slowly.	Rooting depth, percs slowly.
SrC, SrD----------- Swartswood	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Percs slowly, slope.	Slope, rooting depth, percs slowly.	Slope, rooting depth, percs slowly.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
StE*:						
Swartswood	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Percs slowly, slope.	Slope, rooting depth, percs slowly.	Slope, rooting depth, percs slowly.
Lackawanna	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Slope, rooting depth, percs slowly.	Slope, rooting depth, percs slowly.
SwE*, SwF*:						
Swartswood	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Percs slowly, slope.	Slope, large stones, wetness.	Large stones, slope, rooting depth.
Lackawanna	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Slope, wetness, rooting depth.	Slope, rooting depth, percs slowly.
TaB*:						
Torull	Severe: depth to rock.	Severe: piping, wetness.	Severe: no water.	Depth to rock, frost action, slope.	Depth to rock, wetness.	Wetness.
Rock outcrop.						
TeB*:						
Tuller	Severe: depth to rock.	Severe: thin layer, wetness.	Severe: no water.	Percs slowly, depth to rock, frost action.	Depth to rock, wetness, large stones.	Wetness, large stones, droughty.
Rock outcrop.						
TkA, TkB Tunkhannock	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Large stones, too sandy.	Large stones, droughty.
TkC, TkD Tunkhannock	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, too sandy.	Large stones, slope, droughty.
ToE*, ToF*:						
Tunkhannock	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones, too sandy.	Large stones, slope, droughty.
Otisville	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy.	Slope, droughty.
Ud. Udorthents						
UnA Unadilla	Moderate: seepage.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
UnB Unadilla	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Erodes easily	Erodes easily.
VaB Valois	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Favorable	Droughty.

See footnote at end of table.

TABLE 14.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for-- Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Features affecting-- Drainage	Terraces and diversions	Grassed waterways
VaC, VaD, VaE, VaF: Valois	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope	Slope, droughty.
Wa: Wallington	Slight	Severe: piping, wetness.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness, rooting depth.	Wetness, erodes easily, rooting depth.
Wd: Wayland	Slight	Severe: piping, wetness.	Severe: slow refill.	Percs slowly, flooding, frost action.	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
WeA: Wellsboro	Slight	Severe: piping.	Severe: no water.	Percs slowly, frost action.	Wetness, rooting depth, percs slowly.	Rooting depth, percs slowly.
WeB: Wellsboro	Moderate: slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, rooting depth, percs slowly.	Rooting depth, percs slowly.
WeC: Wellsboro	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, rooting depth, slope.	Rooting depth, percs slowly, slope.
WlC*: Wellsboro	Moderate: slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Large stones, rooting depth, wetness.	Large stones, rooting depth, wetness.
Wurtsboro	Moderate: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Percs slowly, slope.	Large stones, wetness, rooting depth.	Large stones, wetness, rooting depth.
WmA: Willowemoc	Moderate: seepage.	Severe: seepage, piping.	Severe: no water.	Percs slowly, frost action.	Wetness, rooting depth.	Droughty, rooting depth.
WmB: Willowemoc	Moderate: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, rooting depth.	Droughty, rooting depth.
WmC: Willowemoc	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, rooting depth.	Slope, droughty, rooting depth.
WoC: Willowemoc	Severe: slope.	Severe: seepage, piping.	Severe: no water.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, droughty, rooting depth.
WuA: Wurtsboro	Moderate: seepage.	Severe: piping.	Severe: no water.	Percs slowly	Percs slowly, wetness, rooting depth.	Percs slowly, wetness, rooting depth.
WuB: Wurtsboro	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Percs slowly, wetness, rooting depth.	Percs slowly, wetness, rooting depth.
WuC: Wurtsboro	Severe: slope.	Severe: piping.	Severe: no water.	Percs slowly, slope.	Slope, percs slowly, wetness.	Percs slowly, wetness, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
Ad: Alden	0-12	Silt loam	ML, OL	A-7, A-5	0	80-100	75-100	65-95	55-85	40-50	5-15
	12-33	Silt loam, silty clay loam, very fine sandy loam.	CL, CL-ML	A-4, A-6	0	80-100	75-100	65-95	55-85	20-35	5-15
	33-61	Gravelly loam, fine sandy loam, silty clay loam.	CL, GC, SC, CL-ML	A-2, A-4, A-6	0-5	60-95	50-90	45-90	30-85	20-35	5-15
AlC*, AlE*: Arnot	0-2	Channery loam	ML, GM, SM	A-2, A-4, A-5	5-10	60-85	55-80	45-80	30-70	35-45	1-9
	2-16	Very channery silt loam, very channery loam.	GM	A-2, A-4, A-1	10-25	30-60	25-55	20-55	15-50	20-35	1-9
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Lordstown	0-3	Channery silt loam.	ML, GM, SM	A-4	5-20	65-85	50-75	45-70	40-65	<30	NP-4
	3-17	Channery silt loam, channery loam.	ML, GM, SM	A-4	5-10	65-85	50-75	45-70	40-65	<30	NP-4
	17-25	Very channery loam, channery silt loam, very channery fine sandy loam.	ML, GM, SM	A-2, A-4, A-1	5-25	40-75	30-70	25-70	15-60	<30	NP-4
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
AoC*, AoE*: Arnot	0-2	Channery loam	ML, GM, SM	A-2, A-4, A-5	5-10	60-85	55-80	45-80	30-70	35-45	1-9
	2-16	Very channery silt loam, very channery loam.	GM	A-2, A-4, A-1	10-25	30-60	25-55	20-55	15-50	20-35	1-9
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Oquaga	0-4	Very channery silt loam.	GM, ML, SM	A-1, A-2, A-4, A-5	10-25	35-70	25-60	20-60	15-55	35-45	2-7
	4-34	Very channery loam, very channery silt loam.	GM, ML, SM, GM-GC	A-1, A-2, A-4	10-25	35-70	25-60	20-60	15-55	20-30	2-7
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
ArC*, ArE*, ArF*: Arnot	0-2	Channery loam	ML, GM, SM	A-2, A-4, A-5	5-10	60-85	55-80	45-80	30-70	35-45	1-9
	2-16	Very channery silt loam, very channery loam.	GM	A-2, A-4, A-1	10-25	30-60	25-55	20-55	15-50	20-35	1-9
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Bb----------------- Barbour	0-8	Loam--------------	ML, CL-ML, SM, SM-SC	A-4, A-2	0	80-100	75-100	50-95	30-90	15-25	2-7
	8-30	Silt loam, fine sandy loam, gravelly loam.	ML, SM, CL-ML, SM-SC	A-4, A-2, A-1	0	60-100	55-95	30-95	15-85	15-25	2-7
	30-61	Loamy sand, very gravelly sand, gravelly loamy fine sand.	SM, SP, GM, GP	A-1, A-2, A-3, A-4	0-5	35-95	30-95	20-80	2-40	---	NP
Bs----------------- Bash	0-5	Silt loam---------	ML, SM	A-2, A-4	0-5	80-100	75-100	45-100	20-90	15-30	NP-5
	5-22	Silt loam, gravelly loam, fine sandy loam.	ML, SM	A-2, A-4	0-5	75-100	70-100	40-100	20-90	15-25	NP-5
	22-45	Silt loam, gravelly loam, fine sandy loam.	ML, SM, GM	A-1, A-2, A-4	0-5	50-100	40-100	30-100	10-90	15-25	NP-5
	45-61	Fine sandy loam, gravelly sandy loam, gravelly loamy sand.	SM, GM, SP-SM, GP-SM	A-1, A-2, A-4	0-5	30-100	40-100	20-80	5-50	<25	NP-5
Ca----------------- Carlisle	0-66	Muck--------------	PT	A-8	---	---	---	---	---	---	---
Ce*: Carlisle---------	0-66	Muck--------------	PT	A-8	---	---	---	---	---	---	---
Palms------------	0-22	Muck	PT	A-8	---	---	---	---	---	---	---
	22-60	Clay loam, silty clay loam, fine sandy loam.	CL-ML, CL	A-4, A-6	0	85-100	80-100	70-95	50-90	25-40	5-20
Alden------------	0-12	Silt loam---------	ML, OL	A-7, A-5	0	80-100	75-100	65-95	55-85	40-50	5-15
	12-33	Silt loam, silty clay loam, very fine sandy loam.	CL, CL-ML	A-4, A-6	0	80-100	75-100	65-95	55-85	20-35	5-15
	33-61	Gravelly loam, fine sandy loam, silty clay loam.	CL, GC, SC, CL-ML	A-2, A-4, A-6	0-5	60-95	50-90	45-90	30-85	20-35	5-15
ChA, ChB, ChC, ChD-------------- Chenango	0-4	Gravelly loam-----	ML, SM, GM	A-2, A-4, A-1	5-15	55-85	55-80	35-80	15-70	<35	NP-10
	4-31	Gravelly silt loam, gravelly fine sandy loam, very gravelly silt loam.	ML, GM, SM	A-2, A-4, A-1	5-10	35-80	30-75	25-75	15-65	<40	NP-10
	31-60	Very gravelly loamy coarse sand, very gravelly sand, gravelly loamy fine sand.	GW, GM, SM, GP	A-1	5-10	25-65	20-60	10-50	1-20	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
CsB, CsC, CsD, CsE, CsF: Cheshire	0-5	Channery loam	SM, GM, ML	A-2, A-4	0-10	65-95	60-80	45-75	25-65	<35	NP-10
	5-26	Fine sandy loam, silt loam, loam.	SM, ML	A-2, A-4	0-15	85-95	70-95	50-85	25-70	<30	NP-6
	26-62	Gravelly sandy loam, fine sandy loam, gravelly fine sandy loam.	SM, GM	A-2, A-4	0-15	65-90	60-90	40-65	20-45	<25	NP-4
ElB, ElC, ElD, ElE, ElF: Elka	0-5	Loam	ML, GM, SM	A-2, A-4	0-5	85-90	80-90	55-85	30-80	<30	NP-5
	5-30	Channery loam, silt loam, sandy loam.	ML, GM, SM	A-2, A-4	0-5	70-100	65-90	40-85	20-80	<30	NP-5
	30-61	Channery very fine sandy loam, silt loam, sandy loam.	ML, GM, SM	A-2, A-4	0-10	70-100	65-90	40-85	20-80	<30	NP-5
Fu*: Fluvaquents.											
Udifluvents.											
Gn: Greenwood	0-8	Peat	PT	A-8	0	---	---	---	---	---	---
	8-75	Mucky peat	PT	A-8	0	---	---	---	---	---	---
HaC*, HaE*: Hawksnest	0-5	Loam	ML, SM	A-2, A-4	0-5	80-95	75-85	50-85	30-80	<20	NP-5
	5-16	Channery silt loam, loam, channery sandy loam.	ML, SM, GM	A-1, A-2, A-4	0-5	55-80	50-75	40-75	20-70	<20	NP-5
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Mongaup	0-3	Loam	ML, SM	A-2, A-4	0-5	80-95	75-85	50-85	30-80	<20	NP-5
	3-12	Gravelly silt loam, loam, gravelly sandy loam.	ML, SM, GM	A-1, A-2, A-4	0-5	60-90	50-70	40-65	20-60	<20	NP-5
	12-18	Gravelly silt loam, loam, gravelly sandy loam.	ML, SM, GM	A-1, A-2, A-4	0-5	60-90	50-70	40-65	20-60	<20	NP-5
	18-22	Gravelly silt loam, loam, gravelly sandy loam.	ML, SM, GM	A-1, A-2, A-4	0-5	60-85	50-70	40-65	20-60	<20	NP-5
	22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
HeF*: Hawksnest	0-5	Loam	ML, SM	A-2, A-4	0-5	80-95	75-85	50-85	30-80	<20	NP-5
	5-16	Channery silt loam, loam, channery sandy loam.	ML, SM, GM	A-1, A-2, A-4	0-5	55-80	50-75	40-75	20-70	<20	NP-5
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
HeF*:											
Mongaup	0-3	Loam	ML, SM	A-2, A-4	0-5	80-95	75-85	50-85	30-80	<20	NP-5
	3-12	Gravelly silt loam, loam, gravelly sandy loam.	ML, SM, GM	A-1, A-2, A-4	0-5	60-90	50-70	40-65	20-60	<20	NP-5
	12-18	Gravelly silt loam, loam, gravelly sandy loam.	ML, SM, GM	A-1, A-2, A-4	0-5	60-90	50-70	40-65	20-60	<20	NP-5
	18-22	Gravelly silt loam, loam, gravelly sandy loam.	ML, SM, GM	A-1, A-2, A-4	0-5	60-85	50-70	40-65	20-60	<20	NP-5
	22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
LaB, LaC, LaD Lackawanna	0-3	Channery loam	GM, ML, CL, SM	A-2, A-4	0-15	40-80	40-75	35-70	20-60	---	---
	3-32	Loam, silt loam, channery silt loam.	GM, ML, CL, SM	A-2, A-4, A-6, A-1	0-20	40-80	40-75	35-70	20-60	20-35	1-14
	32-61	Silt loam, channery silt loam, channery sandy loam.	GM, SM, ML, CL	A-2, A-4, A-6, A-1	0-20	50-85	40-80	35-75	20-55	15-35	1-12
LeB, LeC, LeD Lewbeach	0-8	Silt loam	ML, SM	A-4, A-2	0-5	80-95	75-90	50-90	30-80	<25	NP-5
	8-33	Gravelly loam, channery fine sandy loam, gravelly sandy loam.	GM, ML, SM	A-4, A-2	0-5	55-80	50-75	30-75	15-60	<25	NP-5
	33-60	Gravelly sandy loam, gravelly fine sandy loam, gravelly loam.	ML, GW-GM, SM	A-1, A-2, A-4	2-10	35-80	30-75	20-70	10-60	<25	NP-5
LfE, LfF Lewbeach	0-8	Silt loam	ML, SM	A-4, A-2	5-20	55-80	45-75	30-75	20-65	<25	NP-5
	8-33	Gravelly loam, channery fine sandy loam, gravelly loam.	GM, ML, SM	A-4, A-2	0-5	55-80	50-75	30-75	15-60	<25	NP-5
	33-60	Gravelly sandy loam, gravelly fine sandy loam, gravelly loam.	ML, GW-GM, SM	A-1, A-2, A-4	2-10	35-80	30-75	20-70	10-60	<25	NP-5
LoB Lordstown	0-3	Silt loam	ML, SM	A-4, A-2	5-20	65-85	50-75	45-70	40-65	<30	NP-4
	3-25	Channery silt loam, channery loam.	ML, GM, SM	A-4	5-10	65-85	50-75	45-70	40-65	<30	NP-4
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
LrC*:											
Lordstown-------	0-3	Silt loam--------	ML, SM	A-4, A-2	10-20	65-85	50-75	50-75	40-65	<30	NP-4
	3-25	Channery silt loam, channery loam.	ML, GM, SM	A-4	5-10	65-85	50-75	50-75	40-65	<30	NP-4
	25	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Arnot-----------	0-2	Loam-------------	SM, ML	A-2, A-4, A-5	10-25	60-85	55-80	45-80	30-70	35-45	1-9
	2-16	Very channery silt loam, very channery loam.	GM, GM-GC, SM, SM-SC	A-2, A-4, A-1	10-25	30-60	25-55	20-55	15-50	20-35	1-9
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
MaB, MaC, MaD---- Manlius	0-2	Channery silt loam.	ML, GM, SM, CL-ML	A-2, A-4	5-25	55-80	50-75	35-75	25-70	25-35	4-10
	2-22	Very channery silt loam, very channery loam.	GM, GM-GC, GW-GM	A-2, A-4, A-1	10-25	25-60	20-55	15-55	10-50	25-35	4-10
	22-27	Very channery silt loam, very channery loam.	GM, GM-GC, GW-GM	A-1, A-2, A-4	10-25	20-60	15-55	10-55	5-50	25-35	4-10
	27	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
MdB, MdC--------- Mardin	0-4	Gravelly silt loam.	GM, ML, CL, GC	A-4	0-5	60-80	55-75	45-75	35-70	25-35	5-10
	4-20	Channery silt loam, loam, gravelly loam.	CL, GC, CL-ML, SM-SC	A-4	5-10	60-90	55-90	45-90	35-80	15-25	5-10
	20-61	Channery loam, channery silt loam, very channery loam.	CL, GC, SC, CL-ML	A-2, A-4, A-1	10-25	40-80	35-75	30-70	20-65	20-30	5-10
MnB, MnC, MnD---- Mongaup	0-3	Loam-------------	ML, SM	A-1, A-2, A-4	0-20	80-95	75-85	50-85	30-80	<20	NP-5
	3-22	Gravelly loam, sandy loam, gravelly silt loam.	ML, SM, GM	A-1, A-2, A-4	0-5	60-90	50-70	40-65	20-60	<20	NP-5
	22	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
MrA, MrB, MrC---- Morris	0-20	Loam-------------	ML, CL, CL-ML	A-4	0-10	80-100	75-85	70-85	50-75	20-30	1-10
	20-60	Channery silt loam, channery loam, channery silty clay loam.	GM, SM, CL, SM	A-2, A-4	0-20	60-95	45-80	40-80	25-75	15-25	NP-9

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
Ne: Neversink	0-5	Loam	ML, SM	A-4, A-2	0-5	80-95	75-85	50-85	30-80	<20	NP-5
	5-21	Gravelly loam, gravelly fine sandy loam, gravelly sandy loam.	ML, GM, SM	A-4, A-2, A-1	0-5	35-75	30-70	20-65	15-60	<20	NP-5
	21-60	Gravelly loam, gravelly fine sandy loam, gravelly sandy loam.	ML, GM, SM	A-4, A-2, A-1	5-10	35-75	30-70	20-65	15-60	<20	NP-5
Nf*: Neversink	0-5	Loam	ML, SM	A-2, A-4	2-10	55-80	50-75	30-70	15-65	<20	NP-5
	5-21	Gravelly loam, gravelly fine sandy loam, gravelly sandy loam.	GM, ML, SM	A-1, A-2, A-4	0-5	35-75	30-70	20-65	15-60	<20	NP-5
	21-60	Gravelly loam, gravelly fine sandy loam, gravelly sandy loam.	GM, ML, SM	A-1, A-2, A-4	5-10	35-75	30-70	20-65	15-60	<20	NP-5
Alden	0-12	Silt loam	ML, OL	A-7, A-5	3-10	80-100	75-100	65-95	55-85	40-50	5-15
	12-33	Silt loam, silty clay loam, very fine sandy loam.	CL, CL-ML	A-4, A-6	0	80-100	75-100	65-95	55-85	20-35	5-15
	33-61	Gravelly loam, fine sandy loam, silty clay loam.	CL, GC, SC, CL-ML	A-2, A-4, A-6	0-5	60-95	50-90	45-90	30-85	20-35	5-15
OaA, OaB, OaC: Onteora	0-4	Loam	ML, SM, CL-ML	A-2, A-4	0-5	80-95	75-90	60-85	35-75	<25	NP-5
	4-14	Gravelly loam, channery silt loam, sandy loam.	ML, GM, SM, CL-ML	A-1, A-2, A-4	0-5	55-80	50-75	35-70	20-60	<25	NP-5
	14-60	Gravelly silt loam, channery loam, very channery sandy loam.	ML, GM, SM	A-1, A-2, A-4	5-15	45-80	40-75	25-70	15-60	<25	NP-5
ObB: Onteora	0-4	Loam	ML, SM	A-2, A-4	5-20	50-75	45-70	40-65	30-60	<25	NP-5
	4-14	Gravelly loam, channery silt loam, sandy loam.	ML, GM, SM, CL-ML	A-1, A-2, A-4	0-5	55-80	50-75	35-70	20-60	<25	NP-5
	14-60	Gravelly silt loam, channery loam, very channery sandy loam.	ML, GM, SM	A-1, A-2, A-4	5-15	45-80	40-75	25-70	15-60	<25	NP-5

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
OeB: Oquaga	0-4	Very channery silt loam.	GM, ML, SM	A-1, A-2, A-4, A-5	10-25	35-70	25-60	20-60	15-55	35-45	2-7
	4-34	Very channery loam, very channery silt loam.	GM, ML, SM, GM-GC	A-1, A-2, A-4	10-25	35-70	25-60	20-60	15-55	20-30	2-7
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
OgC*, OgD*: Oquaga	0-4	Very channery silt loam.	GM, ML, SM	A-1, A-2, A-4, A-5	10-25	35-70	25-60	20-60	15-55	35-45	2-7
	4-34	Very channery loam, very channery silt loam.	GM, ML, SM, GM-GC	A-1, A-2, A-4	10-25	35-70	25-60	20-60	15-55	20-30	2-7
	34	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Arnot	0-2	Channery loam	ML, GM, SM	A-2, A-4, A-5	5-10	60-85	55-80	45-80	30-70	35-45	1-9
	2-16	Very channery silt loam, very channery loam.	GM	A-2, A-4, A-1	10-25	30-60	25-55	20-55	15-50	20-35	1-9
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Os: Ossipee	0-11	Muck	PT	A-8	2-15	---	---	---	---	---	---
	11-40	Mucky peat	PT	A-8	2-15	---	---	---	---	---	---
	40-60	Silt loam, very fine sandy loam, sandy loam.	SM, ML, CL-ML, SC	A-4	0	100	100	100	40-90	<30	NP-10
OtA, OtB, OtC, OtD: Otisville	0-9	Gravelly loamy coarse sand.	SM, GM, SW-SM, GW-GM	A-1, A-2	0-10	55-80	50-75	25-50	10-30	---	NP
	9-33	Gravelly loamy sand, gravelly loamy fine sand, very gravelly sand.	SM, SP, GP, GM	A-1	0-10	45-65	40-60	20-50	3-25	---	NP
	33-60	Very gravelly sand, very gravelly loamy sand.	GP, SP, GW-GM, SP-SM	A-1	0-10	35-60	30-55	15-40	0-10	---	NP
Pa: Palms	0-22	Muck	PT	A-8	---	---	---	---	---	---	---
	22-60	Clay loam, silty clay loam, fine sandy loam.	CL-ML, CL	A-4, A-6	0	85-100	80-100	70-95	50-90	25-40	5-20
Pe: Philo	0-10	Silt loam	ML, SM, CL-ML	A-4	0-5	95-100	80-100	85-90	60-80	20-35	1-10
	10-45	Silt loam, loam, sandy loam.	ML, SM, CL-ML	A-4	0-5	95-100	75-100	70-90	45-80	20-35	1-10
	45-60	Stratified sand to silt loam.	GM, SM, ML, CL-ML	A-2, A-4	0-5	60-95	50-90	40-85	30-80	15-30	1-10
Pg*, Ph*. Pits											

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
PmA-------------- Pompton	0-10	Gravelly fine sandy loam.	SM, SM-SC, GM	A-2, A-4	0	55-80	50-75	30-70	15-50	20-30	3-10
	10-30	Fine sandy loam, sandy loam, gravelly sandy loam.	SM, SC, SM-SC	A-2, A-4	0	80-95	50-90	45-75	30-50	20-30	3-10
	30-60	Stratified gravelly loamy sand.	SM, GP-GM, GM, SP-SM	A-1	0	35-80	20-80	20-40	5-15	>20	NP
PmB-------------- Pompton	0-7	Gravelly fine sandy loam.	SM, SM-SC, GM	A-2, A-4	0	55-80	50-75	30-70	15-50	20-30	3-10
	7-34	Fine sandy loam, sandy loam, gravelly sandy loam.	SM, SC, SM-SC	A-2, A-4	0	80-95	50-90	45-75	30-50	20-30	3-10
	34-72	Stratified gravelly loamy sand.	SM, GP-GM, GM, SP-SM	A-1	0	35-80	20-80	20-40	5-15	>20	NP
Po--------------- Pope	0-11	Silt loam--------	ML, CL, SM, CL-ML	A-4	0	85-100	75-100	70-100	45-90	<30	NP-10
	11-32	Fine sandy loam, sandy loam, loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	0	95-100	80-100	51-95	25-75	<30	NP-7
	32-60	Sandy loam, loamy sand.	SM, SM-SC, ML, GM	A-2, A-1, A-4	0-20	45-100	35-100	30-95	15-70	<30	NP-7
Pp--------------- Pope	0-11	Very fine sandy loam.	ML, CL, SM, CL-ML	A-4	0	85-100	75-100	70-100	45-90	<30	NP-10
	11-32	Fine sandy loam, sandy loam, loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	0	95-100	80-100	51-95	25-75	<30	NP-7
	32-60	Sandy loam, loamy sand.	SM, SM-SC, ML, GM	A-2, A-1, A-4	0-20	45-100	35-100	30-95	15-70	<30	NP-7
Ra--------------- Raynham	0-8	Silt loam--------	ML	A-4	0	100	95-100	80-100	55-95	<25	NP-10
	8-30	Silt loam, silt, very fine sandy loam.	ML	A-4	0	100	95-100	80-100	55-95	<25	NP-10
	30-60	Silt loam, silt, very fine sandy loam.	ML	A-4	0	100	95-100	90-100	70-95	<25	NP-10
Re--------------- Red Hook	0-7	Sandy loam-------	ML, SM, SM-SC, CL-ML	A-4, A-2, A-6	0-5	80-100	75-95	45-95	25-80	15-40	1-15
	7-38	Silt loam, loam, very gravelly sandy loam.	ML, SM, GM, SM-SC	A-1, A-2, A-4, A-6	0-5	30-90	25-85	15-80	10-70	15-30	1-15
	38-60	Gravelly loam, gravelly silt loam, very gravelly sandy loam.	GM, SM, SM-SC, ML	A-1, A-2, A-4, A-6	5-10	30-80	25-75	15-75	10-70	15-30	1-15

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
RhA, RhB, RhC---- Riverhead	0-6	Sandy loam-------	SM, ML	A-2, A-4	0-5	95-100	90-100	55-95	30-75	14-18	1-3
	6-30	Sandy loam, fine sandy loam, gravelly sandy loam.	SM, GM	A-2, A-4, A-1	0-5	65-100	60-95	40-80	20-45	14-18	1-3
	30-60	Loamy sand, gravelly loamy sand, fine sandy loam.	SM, SP-SM, GM, GP-GM	A-1, A-2, A-4	0-5	60-90	55-85	30-70	10-45	---	NP
SaB-------------- Scio	0-6	Silt loam--------	ML	A-4	0	100	95-100	90-100	70-90	<20	NP-4
	6-29	Silt loam, very fine sandy loam.	ML	A-4	0	100	95-100	90-100	70-90	<20	NP-4
	29-68	Stratified very gravelly sand to silt loam.	ML, SM, SP, GP-GM	A-4, A-2, A-1, A-3	0	35-95	30-90	15-85	2-80	<10	NP-4
ScA, ScB--------- Scriba	0-6	Loam-------------	ML, SM, CL-ML	A-4, A-2	0-5	80-90	75-85	50-85	30-80	<20	NP-5
	6-18	Gravelly fine sandy loam, very gravelly sandy loam, gravelly silt loam.	GM, ML, SM, CL-ML	A-2, A-4, A-1	0-5	35-75	30-70	20-65	15-60	<20	NP-5
	18-60	Gravelly fine sandy loam, very gravelly sandy loam, gravelly silt loam.	GM, ML, SM, CL-ML	A-2, A-4, A-1	5-10	35-75	30-70	20-65	15-60	<20	NP-5
SeB*:											
Scriba----------	0-6	Loam-------------	GM, ML, SM, CL-ML	A-2, A-4, A-1	5-25	55-80	50-75	40-75	20-70	<20	NP-5
	6-18	Gravelly fine sandy loam, very gravelly sandy loam, gravelly silt loam.	GM, ML, SM, CL-ML	A-2, A-4, A-1	0-5	35-75	30-70	20-65	15-60	<20	NP-5
	18-60	Gravelly fine sandy loam, very gravelly sandy loam, gravelly silt loam.	GM, ML, SM, CL-ML	A-2, A-4, A-1	5-10	35-75	30-70	20-65	15-60	<20	NP-5
Morris----------	0-20	Loam-------------	ML, CL, SM	A-4, A-2	5-25	60-95	55-85	40-80	30-70	20-30	1-10
	20-60	Channery loam, channery silt loam, channery silty clay loam.	GM, ML, CL, SM	A-2, A-4	0-20	60-95	45-80	40-80	25-75	15-25	NP-9
Sn--------------- Suncook	0-8	Fine sandy loam	SM	A-2, A-4	0	95-100	85-100	55-85	25-45	---	NP
	8-44	Stratified loamy fine sand to coarse sand.	SP, SM	A-1, A-2, A-3	0	90-100	70-100	20-85	0-35	---	NP
	44-60	Stratified loamy fine sand to gravelly coarse sand.	SP, SM	A-1, A-2, A-3	0	60-100	45-100	20-85	0-35	---	NP

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
So---------------- Suny	0-4	Fine sandy loam	ML, SM	A-2, A-4	0-5	80-95	75-85	50-85	30-80	<20	NP-5
	4-17	Gravelly silt loam, loam, gravelly sandy loam.	ML, SM, GM	A-1, A-2, A-4	0-5	55-90	50-70	20-65	15-60	<20	NP-5
	17-60	Gravelly silt loam, gravelly loam, gravelly sandy loam.	ML, SM, GM	A-1, A-2, A-4	0-5	55-85	50-70	20-65	15-60	<20	NP-5
Sp---------------- Suny	0-4	Fine sandy loam	ML, SM	A-2, A-4	2-10	55-80	50-75	30-70	15-65	<20	NP-5
	4-17	Gravelly silt loam, loam, gravelly sandy loam.	ML, SM, GM	A-1, A-2, A-4	0-5	55-90	50-70	20-65	15-60	<20	NP-5
	17-60	Gravelly silt loam, gravelly loam, gravelly sandy loam.	ML, SM, GM	A-1, A-2, A-4	0-5	55-85	50-70	20-65	15-60	<20	NP-5
SrB, SrC, SrD---- Swartswood	0-3	Gravelly loam----	SM, ML, GM	A-1, A-2, A-4	0-20	60-90	50-75	30-60	15-55	---	---
	3-26	Gravelly fine sandy loam, flaggy sandy loam, channery loam.	SM, ML, GM	A-1, A-2, A-4	0-25	60-90	50-90	30-85	15-65	<25	NP-3
	26-60	Very gravelly fine sandy loam, flaggy sandy loam, channery loam.	GM, SM, ML, GW-GM	A-1, A-2, A-4	5-25	50-85	35-80	20-75	10-60	<20	NP-3
StE*: Swartswood------	0-3	Gravelly loam----	SM, ML, GM	A-1, A-2, A-4	0-20	60-90	50-75	30-60	15-55	---	---
	3-26	Gravelly fine sandy loam, flaggy sandy loam, channery loam.	SM, ML, GM	A-1, A-2, A-4	0-25	60-90	50-90	30-85	15-65	<25	NP-3
	26-60	Very gravelly fine sandy loam, flaggy sandy loam, channery loam.	GM, SM, ML, GW-GM	A-1, A-2, A-4	5-25	50-85	35-80	20-75	10-60	<20	NP-3
Lackawanna------	0-3	Channery loam----	GM, ML, CL, SM	A-2, A-4	0-15	40-80	40-75	35-70	20-60	---	---
	3-32	Loam, silt loam, channery silt loam.	GM, ML, CL, SM	A-2, A-4, A-6, A-1	0-20	40-80	40-75	35-70	20-60	20-35	1-14
	32-60	Silt loam, channery silt loam, channery sandy loam.	GM, SM, ML, CL	A-2, A-4, A-6, A-1	0-20	50-85	40-80	35-75	20-55	15-35	1-12

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct					Pct	
SwE*, SwF*:											
Swartswood------	0-3	Loam-------------	SM, ML	A-2, A-4, A-1	3-15	60-90	50-85	30-80	15-65	---	---
	3-26	Channery loam, flaggy sandy loam, gravelly fine sandy loam.	SM, ML, GM	A-2, A-4, A-1	0-25	60-90	50-90	30-85	15-65	<25	NP-3
	26-60	Gravelly fine sandy loam, flaggy sandy loam, channery loam.	GM, SM, ML, GW-GM	A-2, A-1, A-4	5-25	50-80	35-80	20-70	10-60	<20	NP-3
Lackawanna------	0-3	Loam-------------	ML, CL, GM, SM	A-4, A-2	3-20	40-100	40-95	35-90	20-85	---	---
	3-32	Channery loam, silt loam, flaggy loam.	GM, ML, CL, SM	A-2, A-4, A-6	0-20	40-80	40-75	35-70	20-60	20-35	1-14
	32-60	Channery loam, channery silt loam, flaggy loam.	GM, SM, ML, CL	A-2, A-4, A-6	0-20	50-85	40-80	35-75	20-55	15-35	1-12
TaB*:											
Torull----------	0-7	Silt loam--------	ML, SM	A-2, A-4	0-5	80-95	75-85	50-85	30-80	40-55	10-20
	7-16	Fine sandy loam, sandy loam.	ML, SM	A-2, A-4	0-5	80-95	75-85	50-85	30-80	20-30	2-10
	16	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
TeB*:											
Tuller----------	0-4	Very fine sandy loam.	ML, SM, MH	A-4, A-7	0-5	85-100	80-95	55-95	35-85	40-55	10-20
	4-11	Channery silt loam, channery loam, fine sandy loam.	GM, GM-GC, SM	A-2, A-4, A-1	10-20	55-70	50-85	30-70	20-50	20-30	2-7
	11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
TkA, TkB, TkC, TkD------------ Tunkhannock	0-6	Gravelly loam----	SM, GM, SP, GP	A-1, A-2, A-4	0-20	50-90	30-70	25-60	10-45	---	---
	6-38	Gravelly silt loam, cobbly loam, very gravelly sandy loam.	SM, GM, SP-SM, GP-GM	A-2, A-1, A-4	0-35	40-80	25-75	20-60	10-45	<25	NP-3
	38-60	Gravelly sandy loam, very gravelly loamy sand, very gravelly sand.	SM, GM, GP-GM, SP-SM	A-1, A-2, A-3	5-35	30-80	25-70	15-55	5-15	<20	NP-2

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
ToE*, ToF*:											
Tunkhannock-----	0-6	Gravelly loam----	SM, GM, SP, GP	A-1, A-2, A-4	0-20	50-90	30-70	25-60	10-45	---	---
	6-38	Gravelly silt loam, cobbly loam, very gravelly sandy loam.	SM, GM, SP-SM, GP-GM	A-2, A-1, A-4	0-35	40-80	25-75	20-60	10-45	<25	NP-3
	38-60	Gravelly sandy loam, very gravelly loamy sand, very gravelly sand.	SM, GM, GP-GM, SP-SM	A-1, A-2, A-3	5-35	30-80	25-70	15-55	5-15	<20	NP-2
Otisville-------	0-9	Gravelly loamy coarse sand.	SM, GM, SW-SM, GW-GM	A-1, A-2	0-10	55-80	50-75	25-50	10-30	---	NP
	9-33	Gravelly loamy sand, gravelly loamy fine sand, very gravelly sand.	SM, SP, GP, GM	A-1	0-10	45-65	40-60	20-50	3-25	---	NP
	33-60	Very gravelly sand, very gravelly loamy sand.	GP, SP, GW-GM, SP-SM	A-1	0-10	35-60	30-55	15-40	0-10	---	NP
Ud. Udorthents											
UnA, UnB--------- Unadilla	0-5	Silt loam--------	ML	A-4	0	100	95-100	90-100	70-90	<35	NP-10
	5-29	Silt loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	95-100	90-100	70-90	<25	NP-10
	29-60	Very gravelly sand, gravelly sand, fine sandy loam.	GM, GP, SM, SP	A-2, A-1, A-3	0-10	35-100	25-95	10-70	1-40	---	NP
VaB, VaC, VaD---- Valois	0-4	Gravelly sandy loam.	ML, GM, SM, GM-GC	A-4, A-2, A-1	0-5	55-80	50-75	35-75	20-70	20-40	1-12
	4-25	Gravelly loam, gravelly silt loam, gravelly sandy loam.	GM, ML, SM, GM-GC	A-4, A-2, A-1	0-10	55-95	50-90	35-90	20-80	15-25	NP-5
	25-62	Gravelly silt loam, gravelly loam, gravelly sandy loam.	GM, GM-GC, SM, ML	A-4, A-2, A-1	0-10	55-75	50-70	30-70	15-65	15-25	NP-5
VaE, VaF--------- Valois	0-4	Gravelly sandy loam.	ML, GM, SM, GM-GC	A-4, A-2, A-1	0-5	55-80	50-75	35-75	20-70	20-40	1-12
	4-25	Gravelly loam, gravelly silt loam, gravelly sandy loam.	GM, ML, SM, GM-GC	A-4, A-2, A-1	0-10	55-95	50-90	35-90	20-80	15-25	NP-5
	25-62	Gravelly silt loam, gravelly loam, gravelly sandy loam.	GM, GM-GC, SM, ML	A-4, A-2, A-1	0-10	55-75	50-70	30-70	15-65	15-25	NP-5

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Frag- ments > 3 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct					Pct	
Wa----------------	0-6	Silt loam--------	ML, CL-ML	A-4	0	100	95-100	90-100	70-90	15-20	3-6
Wallington	6-16	Very fine sandy loam, silt loam.	ML, CL-ML	A-4	0	100	95-100	90-100	70-90	15-20	3-6
	16-33	Very fine sandy loam, silt loam.	ML, CL-ML	A-4	0	100	95-100	90-100	70-90	15-20	3-6
	33-60	Very fine sandy loam, loamy very fine sand, silt loam.	ML, SM	A-4	0	95-100	90-100	65-95	40-90	<20	NP-3
Wd----------------	0-7	Silt loam--------	ML, OL	A-7, A-5	0	100	95-100	90-100	70-95	40-50	5-15
Wayland	7-20	Silt loam, silty clay loam.	ML, CL-ML, CL	A-6, A-4, A-7	0	100	95-100	90-100	70-95	25-45	5-15
	20-60	Stratified silt loam to gravelly fine sandy loam.	CL, CL-ML, SC, GC	A-2, A-4	0	65-100	55-100	50-95	25-90	15-25	5-10
WeA, WeB, WeC----	0-7	Gravelly loam----	ML, CL, SM	A-2, A-4	0-15	70-90	65-85	60-80	30-60	---	---
Wellsboro	7-23	Loam, channery silt loam, gravelly loam.	ML, SM, CL-ML, GM-GC	A-2, A-4	0-15	70-100	60-100	55-95	30-70	15-30	NP-10
	23-66	Loam, channery sandy loam, gravelly silt loam.	SM, GM, ML, CL	A-2, A-4	0-20	55-90	45-90	35-80	25-60	15-30	NP-10
WlC*:											
Wellsboro--------	0-7	Loam-------------	ML, CL, SM	A-4, A-2	5-25	70-100	65-100	60-95	30-90	---	---
	7-23	Loam, channery silt loam, gravelly loam.	ML, SM, CL-ML, GM-GC	A-2, A-4	0-15	70-100	60-100	55-95	30-70	15-30	NP-10
	23-66	Loam, channery silt loam, channery loam.	GM, ML, CL, SM	A-2, A-4	0-20	55-90	45-90	35-80	25-60	15-30	NP-10
Wurtsboro--------	0-2	Loam-------------	SM, ML, GM	A-2, A-4	15-25	70-100	65-90	55-90	30-70	---	---
	2-26	Fine sandy loam, gravelly sandy loam, channery loam.	SM, GM	A-2, A-4	0-15	70-95	55-90	45-85	30-50	<30	NP-4
	26-60	Fine sandy loam, very gravelly sandy loam, channery loam.	SM, GM	A-2, A-4, A-1	0-20	50-95	35-90	30-80	20-50	<25	NP-4
WmA, WmB, WmC----	0-4	Silt loam--------	ML, SM	A-4, A-2	0-5	80-100	75-95	45-95	30-85	<25	NP-5
Willowemoc	4-16	Silt loam, channery loam, gravelly fine sandy loam.	ML, SM, GM	A-4, A-2	0-5	55-95	50-90	35-90	20-80	<25	NP-5
	16-24	Gravelly silt loam, gravelly fine sandy loam, gravelly loam.	ML, SM, GM	A-4, A-2	3-15	50-90	45-85	30-85	20-75	<25	NP-5
	24-60	Gravelly sandy loam, gravelly fine sandy loam, gravelly loam.	ML, SM, GM	A-1, A-2, A-4	5-10	35-80	30-75	20-70	10-60	<25	NP-5

See footnote at end of table.

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
WcC-------------- Willowemoc	0-4	Silt loam--------	ML, SM	A-4, A-2	5-20	50-80	45-75	30-75	20-70	<25	NP-5
	4-16	Silt loam, channery loam, gravelly fine sandy loam.	ML, SM, GM	A-4, A-2	0-5	55-95	50-90	35-90	20-80	<25	NP-5
	16-24	Gravelly sandy loam, gravelly fine sandy loam, gravelly loam.	ML, SM, GM	A-4, A-2	3-15	50-90	45-85	30-85	20-75	<25	NP-5
	24-60	Gravelly sandy loam, gravelly fine sandy loam, gravelly loam.	ML, SM, GM	A-4, A-2, A-1	5-10	35-80	30-75	20-70	10-60	<25	NP-5
WuA, WuB, WuC---- Wurtsboro	0-2	Loam-------------	SM, GM	A-2, A-4	5-20	70-95	65-75	55-70	30-50	---	---
	2-26	Fine sandy loam, gravelly sandy loam, channery loam.	SM, GM	A-2, A-4	0-15	70-95	55-90	45-85	30-50	<30	NP-4
	26-60	Fine sandy loam, very gravelly sandy loam, channery loam.	SM, GM	A-2, A-4, A-1	0-20	50-95	35-90	30-80	20-50	<25	NP-4

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
Ad: Alden	0-12	15-27	1.10-1.40	0.6-2.0	0.16-0.22	4.5-6.5	Low	0.37	5	4-10
	12-33	18-35	1.20-1.50	0.2-0.6	0.14-0.20	4.5-6.5	Low	0.37		
	33-61	18-35	1.50-1.80	0.06-0.6	0.08-0.15	5.1-6.5	Low	0.28		
AlC*, AlE*:										
Arnot	0-2	8-18	1.10-1.40	0.6-2.0	0.10-0.15	3.6-6.0	Low	0.24	2	3-6
	2-16	8-18	1.20-1.50	0.6-2.0	0.08-0.12	3.6-6.0	Low	0.17		
	16	---	---	---	---	---	---	---		
Lordstown	0-3	8-18	1.10-1.40	0.6-2.0	0.11-0.17	4.5-6.5	Low	0.20	3	2-6
	3-17	8-18	1.20-1.50	0.6-2.0	0.10-0.16	4.5-6.0	Low	0.28		
	17-25	5-18	1.20-1.50	0.6-2.0	0.05-0.14	5.1-6.0	Low	0.28		
	25	---	---	---	---	---	---	---		
AoC*, AoE*:										
Arnot	0-2	8-18	1.10-1.40	0.6-2.0	0.10-0.15	3.6-6.0	Low	0.24	2	3-6
	2-16	8-18	1.20-1.50	0.6-2.0	0.08-0.12	3.6-6.0	Low	0.17		
	16	---	---	---	---	---	---	---		
Oquaga	0-4	7-27	1.10-1.40	0.6-2.0	0.05-0.13	3.6-6.0	Low	0.20	3	2-6
	4-34	7-27	1.20-1.50	0.6-2.0	0.04-0.12	3.6-6.0	Low	0.20		
	34	---	---	---	---	---	---	---		
ArC*, ArE*, ArF*:										
Arnot	0-2	8-18	1.10-1.40	0.6-2.0	0.10-0.15	3.6-6.0	Low	0.24	2	3-6
	2-16	8-18	1.20-1.50	0.6-2.0	0.08-0.12	3.6-6.0	Low	0.17		
	16	---	---	---	---	---	---	---		
Rock outcrop.										
Bb: Barbour	0-8	6-18	1.15-1.40	0.6-2.0	0.16-0.21	4.5-6.0	Low	0.32	5	1-5
	8-30	6-18	1.15-1.45	2.0-6.0	0.10-0.19	4.5-6.0	Low	0.32		
	30-61	1-8	1.25-1.55	6.0-20	0.02-0.07	4.5-6.5	Low	0.17		
Bs: Bash	0-5	5-18	1.15-1.40	0.6-2.0	0.15-0.21	3.6-5.5	Low	0.32	5	1-5
	5-22	5-18	1.15-1.55	0.6-2.0	0.10-0.19	3.6-5.5	Low	0.32		
	22-45	1-18	1.15-1.55	0.2-2.0	0.10-0.19	4.5-6.0	Low	0.32		
	45-61	1-18	1.15-1.55	0.2-6.0	0.04-0.16	4.5-6.0	Low	0.24		
Ca: Carlisle	0-66	---	0.13-0.23	0.2-6.0	0.35-0.45	4.5-7.3	---	---	2	>70
Ce*:										
Carlisle	0-66	---	0.13-0.23	0.2-6.0	0.35-0.45	4.5-7.3	---	---	2	>70
Palms	0-22	---	0.25-0.45	0.2-6.0	0.35-0.45	5.1-6.5	---	---	2	>75
	22-60	7-35	1.45-1.75	0.2-2.0	0.14-0.22	5.1-6.5	Low	---		
Alden	0-12	15-27	1.10-1.40	0.6-2.0	0.16-0.22	4.6-6.5	Low	0.37	5	4-10
	12-33	18-35	1.20-1.50	0.2-0.6	0.14-0.20	4.6-6.5	Low	0.37		
	33-61	18-35	1.50-1.80	0.06-0.6	0.08-0.15	5.1-6.5	Low	0.28		
ChA, ChB, ChC, ChD: Chenango	0-4	6-18	1.20-1.50	0.6-6.0	0.08-0.16	4.5-5.5	Low	0.24	3	2-6
	4-31	6-18	1.25-1.55	0.6-6.0	0.07-0.15	4.5-6.0	Low	0.17		
	31-60	1-8	1.45-1.65	6.0-20.0	0.01-0.05	5.1-6.5	Low	0.17		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
CsB, CsC, CsD, CsE, CsF: Cheshire	0-5	4-15	1.00-1.25	0.6-6.0	0.10-0.18	4.5-6.0	Low	0.24	3	2-5
	5-26	4-15	1.40-1.65	0.6-6.0	0.08-0.21	4.5-6.0	Low	0.37		
	26-62	2-15	1.45-1.70	0.6-6.0	0.05-0.15	4.5-6.0	Low	0.24		
ElB, ElC, ElD, ElE, ElF: Elka	0-5	7-15	1.10-1.40	0.6-2.0	0.12-0.18	4.5-6.0	Low	0.28	3	2-6
	5-30	7-15	1.20-1.50	0.6-2.0	0.11-0.17	4.5-6.0	Low	0.28		
	30-61	7-15	1.20-1.50	0.6-2.0	0.11-0.17	4.5-6.0	Low	0.28		
Fu*: Fluvaquents.										
Udifluvents.										
Gn: Greenwood	0-8	---	0.30-0.40	>6.0	0.55-0.65	3.6-4.4	---	---	2	55-75
	8-75	---	0.10-0.25	0.6-6.0	0.45-0.55	3.6-4.4	---	---		
HaC*, HaE*: Hawksnest	0-5	1-18	1.10-1.40	0.6-2.0	0.14-0.18	3.6-5.5	Low	0.28	2	3-7
	5-16	1-18	1.10-1.40	0.6-6.0	0.08-0.16	3.6-5.5	Low	0.20		
	16	---	---	---	---	---	---	---		
Mongaup	0-3	1-18	1.10-1.40	0.6-2.0	0.14-0.18	3.6-5.5	Low	0.28	3	2-6
	3-12	1-18	1.20-1.50	0.6-2.0	0.08-0.16	3.6-5.5	Low	0.24		
	12-18	1-18	1.20-1.60	0.6-2.0	0.08-0.16	3.6-5.5	Low	0.24		
	18-22	1-18	1.20-1.60	0.6-2.0	0.08-0.16	3.6-5.5	Low	0.24		
	22	---	---	---	---	---	---	---		
HeF*: Hawksnest	0-5	1-18	1.10-1.40	0.6-2.0	0.14-0.18	3.6-5.5	Low	0.28	2	3-7
	5-16	1-18	1.10-1.40	0.6-6.0	0.08-0.16	3.6-5.5	Low	0.20		
	16	---	---	---	---	---	---	---		
Mongaup	0-3	1-18	1.10-1.40	0.6-2.0	0.14-0.18	3.6-5.5	Low	0.28	3	2-6
	3-12	1-18	1.20-1.50	0.6-2.0	0.08-0.16	3.6-5.5	Low	0.24		
	12-18	1-18	1.20-1.60	0.6-2.0	0.08-0.16	3.6-5.5	Low	0.24		
	18-22	1-18	1.20-1.60	0.6-2.0	0.08-0.16	3.6-5.5	Low	0.24		
	22	---	---	---	---	---	---	---		
Rock outcrop.										
LaB, LaC, LaD: Lackawanna	0-3	10-27	1.20-1.40	0.6-2.0	0.10-0.14	3.6-5.5	Low	0.28	3	1-3
	3-32	5-18	1.40-1.60	0.6-2.0	0.10-0.14	3.6-5.5	Low	0.20		
	32-61	5-18	1.60-1.80	0.06-0.2	0.06-0.12	4.5-6.0	Low	0.20		
LeB, LeC, LeD: Lewbeach	0-8	1-18	1.10-1.40	0.6-2.0	0.14-0.18	4.5-5.5	Low	0.28	3	3-10
	8-33	1-18	1.20-1.50	0.2-2.0	0.07-0.14	4.5-5.5	Low	0.24		
	33-60	1-18	1.65-2.00	<0.2	0.03-0.07	4.5-6.0	Low	0.24		
LfE, LfF: Lewbeach	0-8	1-18	1.10-1.40	0.6-2.0	0.14-0.18	4.5-5.5	Low	0.20	3	---
	8-33	1-18	1.20-1.50	0.2-2.0	0.07-0.15	4.5-5.5	Low	0.24		
	33-60	1-18	1.65-2.00	<0.2	0.03-0.07	4.5-6.0	Low	0.24		
LoB: Lordstown	0-3	8-18	1.10-1.40	0.1-2.0	0.11-0.17	4.5-6.5	Low	0.20	3	2-6
	3-25	8-18	1.20-1.50	0.6-2.0	0.10-0.16	4.5-6.0	Low	0.28		
	25	---	---	---	---	---	---	---		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
LrC*:										
Lordstown	0-3	8-18	1.10-1.40	0.6-2.0	0.11-0.17	4.5-6.5	Low	0.20	3	---
	3-25	5-26	1.20-1.50	0.6-2.0	0.10-0.16	4.5-6.0	Low	0.28		
	25	---	---	---	---	---	---	---		
Arnot	0-2	8-18	1.10-1.40	0.6-2.0	0.10-0.15	3.6-6.0	Low	0.24	2	3-6
	2-16	8-18	1.20-1.50	0.6-2.0	0.08-0.12	3.6-6.0	Low	0.17		
	16	---	---	---	---	---	---	---		
MaB, MaC, MaD Manlius	0-2	6-18	1.10-1.40	0.6-2.0	0.10-0.18	3.6-5.5	Low	0.20	3	1-5
	2-22	6-18	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low	0.20		
	22-27	6-18	1.70-1.95	0.6-2.0	0.03-0.09	4.5-6.5	Low	0.20		
	27	---	---	---	---	---	---	---		
MdB, MdC Mardin	0-4	10-18	1.10-1.40	0.6-2.0	0.09-0.14	3.6-6.0	Low	0.24	3	3-7
	4-20	10-18	1.20-1.50	0.6-2.0	0.09-0.16	3.6-6.0	Low	0.24		
	20-61	10-18	1.70-2.00	<0.2	0.01-0.03	4.5-6.5	Low	0.24		
MnB, MnC, MnD Mongaup	0-3	1-18	1.10-1.40	0.6-2.0	0.08-0.16	3.6-5.5	Low	0.24	3	---
	3-22	1-18	1.20-1.60	0.6-2.0	0.08-0.16	3.6-5.5	Low	0.24		
	22	---	---	---	---	---	---	---		
MrA, MrB, MrC Morris	0-20	15-25	1.20-1.40	0.6-2.0	0.12-0.16	4.5-6.0	Low	0.32	4	1-3
	20-60	15-32	1.30-1.70	<0.2	0.06-0.08	4.5-6.5	Low	0.24		
Ne Neversink	0-5	1-18	1.10-1.40	0.6-2.0	0.14-0.18	3.6-5.5	Low	0.28	3	3-7
	5-21	1-18	1.10-1.40	0.06-0.2	0.02-0.08	3.6-5.5	Low	0.20		
	21-60	1-18	1.65-1.95	0.06-0.2	0.02-0.08	3.6-5.5	Low	0.20		
Nf*:										
Neversink	0-5	1-18	1.10-1.40	0.6-2.0	0.14-0.18	3.6-5.5	Low	0.24	3	3-7
	5-21	1-18	1.10-1.40	0.06-0.2	0.02-0.08	3.6-5.5	Low	0.20		
	21-60	1-18	1.65-1.95	0.06-0.2	0.02-0.08	3.6-5.5	Low	0.20		
Alden	0-12	15-27	1.10-1.40	0.6-2.0	0.16-0.22	5.1-7.3	Low	0.28	5	4-10
	12-33	18-35	1.20-1.50	0.2-0.6	0.14-0.20	5.6-7.3	Low	0.37		
	33-61	18-35	1.50-1.80	0.06-0.6	0.08-0.15	6.1-8.4	Low	0.28		
OaA, OaB, OaC Onteora	0-4	1-18	1.10-1.40	0.6-2.0	0.13-0.20	3.6-6.0	Low	0.28	3	4-12
	4-14	1-18	1.10-1.40	0.6-2.0	0.07-0.15	4.5-6.0	Low	0.20		
	14-60	1-18	1.70-2.00	<0.2	0.01-0.03	4.5-6.0	Low	0.20		
ObB Onteora	0-4	1-18	1.10-1.40	0.6-2.0	0.09-0.17	3.6-6.0	Low	0.20	3	4-12
	4-14	1-18	1.10-1.40	0.6-2.0	0.07-0.15	4.5-6.0	Low	0.20		
	14-60	1-18	1.70-2.00	<0.2	0.01-0.03	4.5-6.0	Low	0.20		
OeB Oquaga	0-4	7-27	1.10-1.40	0.6-2.0	0.05-0.13	3.6-6.0	Low	0.20	3	2-6
	4-34	7-27	1.20-1.50	0.6-2.0	0.04-0.12	3.6-6.0	Low	0.20		
	34	---	---	---	---	---	---	---		
OgC*, OgD*:										
Oquaga	0-4	7-27	1.10-1.40	0.6-2.0	0.05-0.13	3.6-6.0	Low	0.20	3	2-6
	4-34	7-27	1.20-1.50	0.6-2.0	0.04-0.12	3.6-6.0	Low	0.20		
	34	---	---	---	---	---	---	---		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
OgC*, OgD*:										
Arnot	0-2	8-18	1.10-1.40	0.6-2.0	0.10-0.15	3.6-6.0	Low	0.24	2	3-6
	2-16	8-18	1.20-1.50	0.6-2.0	0.08-0.12	3.6-6.0	Low	0.17		
	16	---	---	---	---	---	---	----		
Os	0-11	---	0.15-0.25	0.6-6.0	0.45-0.60	3.6-4.4	High	----	---	80-95
Ossipee	11-40	---	0.15-0.25	0.6-6.0	0.45-0.60	3.6-4.4	High	----		
	40-60	5-10	1.20-1.50	0.2-2.0	0.11-0.19	5.1-6.5	Low	----		
OtA, OtB, OtC, OtD	0-9	1-10	1.10-1.40	6.0-20.0	0.05-0.12	3.6-5.5	Low	0.17	3-2	2-4
Otisville	9-33	1-5	1.25-1.55	6.0-20.0	0.02-0.05	3.6-5.5	Low	0.17		
	33-60	1-5	1.45-1.65	>6.0	0.01-0.02	4.5-6.0	Low	0.17		
Pa	0-22	---	0.25-0.45	0.2-6.0	0.35-0.45	5.1-6.5	---	----	2	>75
Palms	22-60	7-35	1.45-1.75	0.2-2.0	0.14-0.22	5.1-6.5	Low	----		
Pe	0-10	10-18	1.20-1.40	0.6-2.0	0.14-0.20	4.5-6.0	Low	0.37	5	2-4
Philo	10-45	10-18	1.20-1.40	0.6-2.0	0.10-0.20	4.5-6.0	Low	0.32		
	45-60	5-18	1.20-1.40	2.0-6.0	0.06-0.10	4.5-6.0	Low	0.24		
Pg*, Ph*. Pits										
PmA, PmB	0-10	8-18	1.15-1.45	0.6-6.0	0.09-0.14	4.5-5.5	Low	0.24	3	2-4
Pompton	10-30	10-18	1.50-1.65	0.6-6.0	0.12-0.16	4.5-5.5	Low	0.24		
	30-60	2-12	1.45-1.70	>6.0	0.05-0.10	4.5-5.5	Low	0.17		
Po, Pp	0-11	5-15	1.20-1.40	0.6-2.0	0.14-0.23	3.6-5.5	Low	0.37	5	1-4
Pope	11-32	5-18	1.30-1.60	0.6-6.0	0.10-0.18	3.6-5.5	Low	0.28		
	32-60	5-20	1.30-1.60	0.6-6.0	0.10-0.18	3.6-5.5	Low	0.28		
Ra	0-8	3-16	1.20-1.50	0.6-2.0	0.20-0.30	5.1-7.3	Low	0.49	5	3-10
Raynham	8-30	3-16	1.20-1.50	0.2-2.0	0.18-0.26	5.1-7.3	Low	0.64		
	30-60	3-16	1.20-1.50	0.06-0.2	0.18-0.22	5.6-7.8	Low	0.64		
Re	0-7	8-18	1.10-1.40	0.6-2.0	0.14-0.19	3.6-6.0	Low	0.32	3	3-12
Red Hook	7-38	5-18	1.25-1.55	0.6-2.0	0.04-0.17	4.5-5.5	Low	0.24		
	38-60	5-18	1.45-1.65	0.2-2.0	0.04-0.11	4.5-6.0	Low	0.17		
RhA, RhB, RhC	0-6	3-10	1.10-1.40	2.0-6.0	0.14-0.20	3.6-6.0	Low	0.28	3	2-4
Riverhead	6-30	1-8	1.25-1.55	2.0-6.0	0.09-0.13	3.6-6.0	Low	0.28		
	30-60	1-8	1.25-1.55	>20	0.04-0.13	4.5-6.0	Low	0.17		
SaB	0-6	2-15	1.20-1.50	0.6-2.0	0.18-0.21	4.5-6.0	Low	0.49	3	2-8
Scio	6-29	2-15	1.20-1.50	0.6-2.0	0.17-0.20	4.5-6.0	Low	0.64		
	29-68	0-5	1.45-1.65	2.0-20.0	0.02-0.19	5.1-7.3	Low	0.17		
ScA, ScB	0-6	1-18	1.10-1.40	0.6-2.0	0.14-0.18	3.6-6.5	Low	0.28	3	3-7
Scriba	6-18	1-18	1.70-2.00	0.06-0.2	0.-0.04	3.6-6.5	Low	0.20		
	18-60	1-18	1.65-1.95	0.06-0.2	0.-0.04	5.1-6.5	Low	0.20		
SeB*:										
Scriba	0-6	1-18	1.10-1.40	0.6-2.0	0.08-0.16	3.6-6.5	Low	0.20	3	3-7
	6-18	1-18	1.70-2.00	0.06-0.2	0.-0.04	3.6-6.5	Low	0.20		
	18-60	1-18	1.65-1.95	0.06-0.2	0.-0.04	5.1-6.5	Low	0.20		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
SeB*:										
Morris----------	0-20	15-25	1.20-1.40	0.6-2.0	0.12-0.16	4.5-6.5	Low----------	0.24	4	---
	20-60	15-32	1.30-1.70	<0.2	0.06-0.08	4.5-6.5	Low----------	0.24		
Sn--------------- Suncook	0-8	1-5	1.10-1.30	>6.0	0.10-0.17	4.5-6.5	Low----------	0.17	5	2-5
	8-44	0-3	1.20-1.50	>6.0	0.03-0.10	4.5-6.5	Low----------	0.17		
	44-60	0-3	1.20-1.50	>6.0	0.01-0.10	4.5-6.5	Low----------	0.10		
So--------------- Suny	0-4	1-18	1.10-1.40	0.6-2.0	0.14-0.18	3.6-5.5	Low----------	0.28	3	4-8
	4-17	1-18	1.20-1.50	0.06-0.2	0.02-0.08	3.6-5.5	Low----------	0.20		
	17-60	1-18	1.60-1.95	0.06-0.2	0.02-0.08	3.6-5.5	Low----------	0.20		
Sp--------------- Suny	0-4	1-18	1.10-1.40	0.6-2.0	0.14-0.18	3.6-5.5	Low----------	0.24	3	4-8
	4-17	1-18	1.20-1.50	0.06-0.2	0.02-0.08	3.6-5.5	Low----------	0.20		
	17-60	1-18	1.60-1.95	0.06-0.2	0.02-0.08	3.6-5.5	Low----------	0.20		
SrB, SrC, SrD---- Swartswood	0-3	12-20	1.20-1.40	0.6-2.0	0.08-0.12	3.6-5.5	-------------	0.20	3	1-3
	3-26	10-20	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.20		
	26-60	8-20	1.40-1.80	0.06-0.6	0.06-0.10	3.6-5.5	Low----------	0.20		
StE*:										
Swartswood------	0-3	12-20	1.20-1.40	0.6-2.0	0.08-0.12	3.6-5.5	-------------	0.20	3	1-3
	3-26	10-20	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.20		
	26-60	8-20	1.40-1.80	0.06-0.6	0.06-0.10	3.6-5.5	Low----------	0.20		
Lackawanna------	0-3	10-27	1.20-1.40	0.6-2.0	0.10-0.14	4.5-5.5	Low----------	0.28	3	1-3
	3-32	5-18	1.40-1.60	0.6-2.0	0.10-0.14	4.5-5.5	Low----------	0.20		
	32-60	5-18	1.60-1.80	0.06-0.2	0.06-0.12	4.5-6.0	Low----------	0.20		
SwE*, SwF*:										
Swartswood------	0-3	12-20	1.20-1.40	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.17	3	---
	3-26	10-20	1.20-1.50	0.6-2.0	0.08-0.12	3.6-5.5	Low----------	0.20		
	26-60	8-20	1.40-1.80	0.06-0.6	0.06-0.10	3.6-5.5	Low----------	0.20		
Lackawanna------	0-3	10-27	1.20-1.40	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.24	3	---
	3-32	5-18	1.40-1.60	0.6-2.0	0.10-0.16	4.5-5.5	Low----------	0.20		
	32-60	5-18	1.60-1.80	0.06-0.2	0.06-0.12	4.5-6.0	Low----------	0.20		
TaB*:										
Torull----------	0-7	7-27	1.10-1.40	0.6-2.0	0.14-0.18	4.5-5.5	Low----------	0.28	2	4-9
	7-16	7-27	1.10-1.40	0.6-2.0	0.08-0.16	4.5-5.5	Low----------	0.28		
	16	---	---	---	---	---	-------------	----		
Rock outcrop.										
TeB*:										
Tuller----------	0-4	10-27	1.10-1.40	0.6-2.0	0.15-0.21	3.6-6.0	Low----------	0.28	2	4-9
	4-11	10-27	1.20-1.50	0.06-0.6	0.06-0.10	4.5-5.5	Low----------	0.17		
	11	---	---	---	---	---	-------------	----		
Rock outcrop.										
TkA, TkB, TkC, TkD------------- Tunkhannock	0-6	10-20	1.20-1.40	2.0-6.0	0.08-0.15	3.6-6.0	Low----------	0.24	3	2-4
	6-38	10-20	1.40-1.60	2.0-6.0	0.08-0.12	3.6-6.0	Low----------	0.17		
	38-60	10-20	1.40-1.60	2.0-20	0.01-0.08	3.6-6.0	Low----------	0.17		
ToE*, ToF*:										
Tunkhannock-----	0-6	10-20	1.20-1.40	2.0-6.0	0.08-0.15	3.6-6.0	Low----------	0.24	3	2-4
	6-38	10-20	1.40-1.60	2.0-6.0	0.08-0.12	3.6-6.0	Low----------	0.17		
	38-60	10-20	1.40-1.60	2.0-20	0.01-0.08	3.6-6.0	Low----------	0.17		

See footnote at end of table.

TABLE 16.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH				Pct
ToE*, ToF*:										
Otisville-------	0-9	1-10	1.10-1.40	6.0-20.0	0.05-0.12	3.6-5.5	Low----------	0.17	3-2	2-4
	9-33	1-5	1.25-1.55	6.0-20.0	0.02-0.05	3.6-5.5	Low----------	0.17		
	33-60	1-5	1.45-1.65	>6.0	0.01-0.02	4.5-6.0	Low----------	0.17		
Ud. Udorthents										
UnA, UnB--------- Unadilla	0-5	2-18	1.20-1.50	0.6-2.0	0.18-0.21	4.5-6.0	Low----------	0.49	3	2-7
	5-29	1-18	1.20-1.50	0.6-2.0	0.17-0.20	4.5-6.0	Low----------	0.64		
	29-60	1-3	1.45-1.65	2.0-20.0	0.01-0.10	5.1-7.8	Low----------	0.17		
VaB, VaC, VaD---- Valois	0-4	6-18	1.10-1.40	0.6-2.0	0.08-0.16	3.6-6.0	Low----------	0.24	3	2-6
	4-25	6-18	1.20-1.50	0.6-2.0	0.07-0.14	3.6-6.0	Low----------	0.24		
	25-62	6-18	1.20-1.50	0.6-6.0	0.07-0.14	3.6-6.0	Low----------	0.24		
VaE, VaF--------- Valois	0-4	6-18	1.10-1.40	0.6-2.0	0.08-0.16	3.6-6.0	Low----------	0.24	3	2-6
	4-25	6-18	1.20-1.50	0.6-2.0	0.07-0.14	3.6-6.0	Low----------	0.24		
	25-62	6-18	1.20-1.50	0.6-6.0	0.07-0.14	3.6-6.0	Low----------	0.24		
Wa--------------- Wallington	0-6	5-18	1.20-1.50	0.6-2.0	0.19-0.21	4.5-6.5	Low----------	0.49	3	2-6
	6-16	5-18	1.20-1.50	0.6-2.0	0.18-0.20	4.5-6.0	Low----------	0.64		
	16-33	5-18	1.50-1.80	0.06-0.2	0.10-0.14	5.1-6.5	Low----------	0.64		
	33-60	2-18	1.45-1.65	0.06-0.2	0.10-0.14	5.6-6.5	Low----------	0.64		
Wd--------------- Wayland	0-7	15-35	1.05-1.40	0.2-2.0	0.17-0.22	5.1-6.5	Low----------	0.43	5	4-8
	7-20	18-35	1.10-1.60	0.06-0.2	0.16-0.20	5.1-7.3	Low----------	0.43		
	20-60	15-25	1.25-1.55	0.06-0.2	0.08-0.19	5.6-8.4	Low----------	0.43		
WeA, WeB, WeC---- Wellsboro	0-7	15-25	1.20-1.40	0.6-2.0	0.10-0.14	4.5-6.0	Low----------	0.28	3	1-3
	7-23	15-27	1.30-1.50	0.6-2.0	0.10-0.14	4.5-6.0	Low----------	0.28		
	23-66	15-27	1.30-1.60	0.06-0.2	0.06-0.10	4.5-6.0	Low----------	0.28		
WlC*:										
Wellsboro-------	0-7	15-25	1.20-1.40	0.6-2.0	0.10-0.14	4.5-6.0	Low----------	0.24	3	---
	7-23	15-27	1.30-1.50	0.6-2.0	0.10-0.14	4.5-6.0	Low----------	0.28		
	23-66	15-27	1.30-1.60	0.06-0.2	0.06-0.10	4.5-6.0	Low----------	0.28		
Wurtsboro-------	0-2	10-20	1.20-1.40	0.6-2.0	0.10-0.16	3.6-5.5	Low----------	0.24	3-2	---
	2-26	10-20	1.40-1.60	0.6-2.0	0.10-0.14	3.6-5.5	Low----------	0.28		
	26-60	10-20	1.60-1.80	0.06-0.2	0.08-0.12	3.6-5.5	Low----------	0.28		
WmA, WmB, WmC---- Willowemoc	0-4	1-18	1.10-1.40	0.6-2.0	0.14-0.20	3.6-5.5	Low----------	0.28	3	3-10
	4-16	1-18	1.10-1.40	0.6-2.0	0.08-0.19	3.6-5.5	Low----------	0.24		
	16-24	1-18	1.20-1.55	0.6-2.0	0.06-0.17	3.6-5.5	Low----------	0.24		
	24-60	1-18	1.65-2.00	<0.2	0.01-0.03	3.6-5.5	Low----------	0.20		
WoC-------------- Willowemoc	0-4	1-18	1.10-1.40	0.6-2.0	0.08-0.19	3.6-5.5	Low----------	0.20	3	---
	4-16	1-18	1.10-1.40	0.6-2.0	0.08-0.19	3.6-5.5	Low----------	0.24		
	16-24	1-18	1.20-1.55	0.6-2.0	0.06-0.17	3.6-5.5	Low----------	0.24		
	24-60	1-18	1.65-2.00	<0.2	0.01-0.03	3.6-5.5	Low----------	0.20		
WuA, WuB, WuC---- Wurtsboro	0-2	10-20	1.20-1.40	0.6-2.0	0.10-0.14	3.6-5.5	Low----------	0.28	---	1-3
	2-26	10-20	1.40-1.60	0.6-2.0	0.10-0.14	3.6-5.5	Low----------	0.28		
	26-60	10-20	1.60-1.80	0.06-0.2	0.08-0.12	3.6-5.5	Low----------	0.28		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
Ad----------------- Alden	D	None---------	---	---	+1-0.5	Apparent	Nov-Jun	>60	---	High-----	High-----	Low.
AlC*, AlE*:												
Arnot------------	C/D	None---------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low------	High.
Lordstown--------	C	None---------	---	---	>6.0	---	---	20-40	Hard	Moderate	Low------	High.
AoC*, AoE*:												
Arnot------------	C/D	None---------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low------	High.
Oquaga-----------	C	None---------	---	---	>6.0	---	---	20-40	Hard	Moderate	Low------	Moderate.
ArC*, ArE*, ArF*:												
Arnot------------	C/D	None---------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low------	High.
Rock outcrop.												
Bb----------------- Barbour	B	Rare---------	---	---	3.0-6.0	Apparent	Jan-Apr	>60	---	Moderate	Low------	Moderate.
Bs----------------- Bash	C	Occasional	Brief-----	Dec-Apr	0.5-1.5	Apparent	Dec-May	>60	---	High-----	Moderate	Moderate.
Ca----------------- Carlisle	A/D	None---------	---	---	+.5-1.0	Apparent	Sep-Jun	>60	---	High-----	High-----	Low.
Ce*:												
Carlisle---------	A/D	None---------	---	---	+.5-1.0	Apparent	Sep-Jun	>60	---	High-----	High-----	Low.
Palms------------	A/D	None---------	---	---	+1-1.0	Apparent	Nov-May	>60	---	High-----	High-----	Moderate.
Alden------------	D	None---------	---	---	+1-0.5	Apparent	Nov-Jun	>60	---	High-----	High-----	Low.
ChA, ChB, ChC, ChD--------------- Chenango	A	None---------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
CsB, CsC, CsD, CsE, CsF--------- Cheshire	B	None---------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
ElB, ElC, ElD, ElE, ElF: Elka	C	None	---	---	>6.0	---	---	>60	---	Moderate	Low	High.
Fu*:												
Fluvaquents.												
Udifluvents.												
Gn: Greenwood	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	High	High	High.
HaC*, HaE*:												
Hawksnest	C/D	None	---	---	>6.0	---	---	10-20	Hard	Moderate	Low	High.
Mongaup	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	Low	Moderate.
HeF*:												
Hawksnest	C/D	None	---	---	>6.0	---	---	10-20	Hard	Moderate	Low	High.
Mongaup	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	Low	Moderate.
Rock outcrop.												
LaB, LaC, LaD: Lackawanna	C	None	---	---	2.5-6.0	Perched	Nov-Mar	>60	---	Moderate	Low	Moderate.
LeB, LeC, LeD, LfE, LfF: Lewbeach	C	None	---	---	2.0-4.0	Perched	Mar-May	>60	---	Moderate	Moderate	Moderate.
LoB: Lordstown	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	Low	High.
LrC*:												
Lordstown	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	Low	High.
Arnot	C/D	None	---	---	>6.0	---	---	10-20	Hard	Moderate	Low	High.
MaB, MaC, MaD: Manlius	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	Low	Moderate.
MdB, MdC: Mardin	C	None	---	---	1.5-2.0	Perched	Mar-May	>60	---	Moderate	Moderate	Low.
MnB, MnC, MnD: Mongaup	C	None	---	---	>6.0	---	---	20-40	Hard	Moderate	Low	Moderate.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
MrA, MrB, MrC----- Morris	C	None--------	---	---	0.5-1.5	Perched	Nov-Mar	>60	---	High-----	High-----	Moderate.
Ne---------------- Neversink	D	None--------	---	---	0-0.5	Perched	Dec-Apr	>60	---	High-----	High-----	High.
Nf*:												
Neversink---------	D	None--------	---	---	0-0.5	Perched	Dec-Apr	>60	---	High-----	High-----	High.
Alden-------------	D	None--------	---	---	+1-0.5	Apparent	Nov-Jun	>60	---	High-----	High-----	Low.
OaA, OaB, OaC, ObB-------------- Onteora	C	None--------	---	---	0.5-1.5	Perched	Nov-Apr	>60	---	High-----	High-----	Moderate.
OeB--------------- Oquaga	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	Low------	Moderate.
OgC*, OgD*:												
Oquaga-----------	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	Low------	Moderate.
Arnot------------	C/D	None--------	---	---	>6.0	---	---	10-20	Hard	Moderate	Low------	High.
Os---------------- Ossipee	D	None--------	---	---	+1-0.5	Apparent	Jan-Dec	>60	---	High-----	Moderate	High.
OtA, OtB, OtC, OtD-------------- Otisville	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.
Pa---------------- Palms	A/D	None--------	---	---	+1-1.0	Apparent	Nov-May	>60	---	High-----	High-----	Moderate.
Pe---------------- Philo	B	Occasional	Very brief	Dec-May	1.5-3.0	Apparent	Dec-Apr	>40	Hard	Moderate	Low------	High.
Pg*, Ph*. Pits												
PmA, PmB---------- Pompton	B	Rare--------	---	---	1.0-2.0	Apparent	Oct-May	>60	---	High-----	Moderate	High.
Po---------------- Pope	B	Occasional	Very brief to brief.	Nov-Apr	>6.0	---	---	>60	---	Moderate	Low------	High.
Pp---------------- Pope	B	Rare--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
Ra: Raynham	C	None	---	---	0.5-2.0	Apparent	Nov-May	>60	---	High	High	Moderate.
Re: Red Hook	C	Rare	---	---	0.5-1.5	Apparent	Dec-May	>60	---	High	High	Moderate.
RhA, RhB, RhC: Riverhead	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	High.
SaB: Scio	B	None	---	---	1.5-2.0	Apparent	Mar-May	>60	---	High	Moderate	Moderate.
ScA, ScB: Scriba	C	None	---	---	0.5-1.5	Perched	Feb-Mar	>60	---	High	Moderate	Moderate.
SeB*:												
Scriba	C	None	---	---	0.5-1.5	Perched	Feb-Apr	>60	---	High	Moderate	Moderate.
Morris	C	None	---	---	0.5-1.5	Perched	Nov-Mar	>60	---	High	High	Moderate.
Sn: Suncook	A	Occasional	Brief	Mar-May	3.0-6.0	Apparent	Jan-Apr	>60	---	Low	Low	High.
So, Sp: Suny	D	None	---	---	0-0.5	Perched	Nov-Apr	>60	---	High	High	High.
SrB, SrC, SrD: Swartswood	C	None	---	---	2.5-6.0	Perched	Nov-Mar	>60	---	Moderate	Low	High.
StE*, SwE*, SwF*:												
Swartswood	C	None	---	---	2.5-6.0	Perched	Nov-Mar	>60	---	Moderate	Low	High.
Lackawanna	C	None	---	---	2.5-6.0	Perched	Nov-Mar	>60	---	Moderate	Low	Moderate.
TaB*:												
Torull	D	None	---	---	0.5-1.0	Perched	Dec-Jun	10-20	Hard	High	High	High.
Rock outcrop.												
TeB*:												
Tuller	D	None	---	---	0.5-1.0	Perched	Dec-Jun	10-20	Hard	High	High	High.
Rock outcrop.												
TkA, TkB, TkC, TkD: Tunkhannock	A	None	---	---	>6.0	---	---	>60	---	Low	Low	High.

See footnote at end of table.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
ToE*, ToF*:												
Tunkhannock------	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.
Otisville--------	A	None--------	---	---	>6.0	---	---	>60	---	Low------	Low------	High.
Ud. Udorthents												
UnA, UnB---------- Unadilla	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Low------	Moderate.
VaB, VaC, VaD, VaE, VaF--------- Valois	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
Wa---------------- Wallington	C	None--------	---	---	0.5-1.5	Perched	Jan-Apr	>60	---	High-----	High-----	Moderate.
Wd---------------- Wayland	C/D	Frequent----	Brief-----	Nov-Jun	0-0.5	Apparent	Nov-Jun	>60	---	High-----	High-----	Low.
WeA, WeB, WeC----- Wellsboro	C	None--------	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	High-----	High-----	Moderate.
WlC*:												
Wellsboro--------	C	None--------	---	---	1.5-3.0	Perched	Nov-Mar	>60	---	High-----	High-----	Moderate.
Wurtsboro--------	C	None--------	---	---	1.0-3.0	Perched	Nov-Mar	>60	---	Moderate	High-----	High.
WmA, WmB, WmC, WoC-------------- Willowemoc	C	None--------	---	---	1.5-2.5	Perched	Oct-May	>60	---	High-----	High-----	Moderate.
WuA, WuB, WuC----- Wurtsboro	C	None--------	---	---	1.0-3.0	Perched	Nov-Mar	>60	---	Moderate	High-----	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--ENGINEERING INDEX TEST DATA

(Dashes indicate data were not available, LL means liquid limit; PI, plasticity index; MD, maximum dry density; OM, optimum moisture; LS, linear shrinkage; and NP, nonplastic)

Soil name*, report number, horizon, and depth in inches	Classification		Grain-size distribution											LL	PI	Moisture density		LS
			>3	Percentage passing sieve--							Percentage smaller than--							
	AASHTO	Unified		2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			MD	OM	
			Pct											Pct		Lb/cu ft	Pct	Pct
Bash silt loam: (S79NY-105-011)																		
BA--- 2 to 5	A-4 (00)	ML	---	---	---	---	100	99.9	98.9	75.8	31.4	9.8	5.3	29.5	28.4	97.3	22.0	2.4
Bw1-- 5 to 13	A-4 (00)	MH	---	---	---	---	---	100	99.1	68.3	28.3	9.4	4.7	NP	NP	105.7	17.7	2.4
Bw2-- 13 to 22	A-4 (00)	ML	---	---	---	---	---	100	97.1	58.0	24.5	8.6	5.1	NP	NP	111.3	16.0	1.4
C1--- 22 to 45	A-4 (00)	ML	---	---	---	---	---	100	98.4	54.6	17.2	6.6	4.5	NP	NP	114.2	13.7	1.6
C2--- 45 to 55	A-4 (CO)	ML	---	---	---	---	---	100	97.9	53.1	19.4	8.8	5.3	NP	NP	109.7	15.5	2.0
Lackawanna channery loam: (S79NY-105-017)																		
Bw1-- 3 to 13	A-2-4(00)	GM	0	94.1	80.2	68.2	60.9	56.3	49.1	32.3	17.1	6.8	3.6	NP	NP	110.5	16.0	3.0
Bw2-- 13 to 32	A-4 (00)	SM	0	97.1	88.1	82.0	76.9	72.1	64.2	40.9	22.1	11.0	6.5	21.1	17.6	122.5	12.3	3.0
Bx-- 32 to 53	A-4 (00)	SM-SC	0	100	85.4	85.4	80.0	75.2	66.6	45.4	26.5	14.7	9.8	21.3	15.7	116.9	12.1	2.6
Lordstown silt loam: (S79NY-105-006)																		
Bw1-- 3 to 11	A-4 (00)	SM	0	95.8	89.0	83.2	77.3	72.2	62.7	44.4	19.1	6.9	3.8	37.4	35.6	99.7	19.6	3.0
Bw2-- 11 to 17	A-4 (00)	ML	0	98.5	90.7	82.7	77.1	71.2	63.9	51.0	22.9	10.6	5.5	24.3	21.5	120.5	12.8	3.0
BC--- 17 to 25	A-4 (00)	GM	0	95.6	77.9	69.1	62.7	58.7	49.9	32.1	18.2	8.3	4.1	19.0	15.9	127.2	9.7	2.0
R---- 25+																		
Oquaga very channery silt loam: (S79NY-105-017)																		
A1--- 0 to 4	A-2-5(00)	GM	0	---	93.0	74.6	58.4	44.1	32.8	25.8	13.3	5.5	3.4	47.9	41.2	115.5	12.5	6.0
Bw1-- 4 to 11	A-1-6(00)	SM	0	---	96.9	89.9	73.9	47.6	30.5	24.7	12.4	4.8	2.6	41.4	36.6	111.2	17.6	4.0
Bw2-- 11 to 28	A-1-6(00)	SM	0	99.1	96.4	87.9	69.2	40.6	22.0	17.6	9.0	4.0	2.1	38.0	33.9	127.3	11.5	4.4
BC--- 28 to 34	A-1-6(00)	SM-SC	0	100	91.6	79.1	61.2	40.2	26.6	20.2	11.5	4.3	2.5	26.8	22.5	---	---	2.0
R---- 34+																		

See footnote at end of table.

TABLE 18.--ENGINEERING INDEX TEST DATA--Continued

Soil name*, report number, horizon, and depth in inches	Classification		Grain-size distribution											LL	PI	Moisture density		LS
			>3	Percentage passing sieve--							Percentage smaller than--							
	AASHTO	Unified		2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			MD	OM	
			Pct											Pct		Lb/cu ft	Pct	Pct
Otisville gravelly loamy coarse sand: (S79NY-105-001)																		
Ap--- 0 to 9	A-1-b(00)	SW-SM	0	100	92.4	81.3	70.0	58.1	28.4	10.7	---	---	---	NP	NP	129.2	8.3	2.6
Bw1-- 9 to 15	A-1-a(00)	SW	0	100	88.3	74.6	62.2	50.1	15.1	5.3	---	---	---	NP	NP	131.2	8.8	---
Bw2-- 15 to 33	A-1-a(00)	GW	0	92.0	62.1	46.1	35.3	25.8	5.7	2.8	---	---	---	NP	NP	134.0	8.7	---
C---- 33 to 60	A-1-a(00)	GP	0	94.1	60.1	43.9	35.6	29.4	5.5	2.0	---	---	---	NP	NP	130.3	9.5	---
Scio silt loam: (S79NY-105-003)																		
Ap--- 0 to 6	A-4 (00)	ML	0	97.8	96.8	96.0	95.5	94.1	91.3	78.5	42.5	16.1	6.9	36.8	31.1	92.2	24.7	5.0
B21-- 6 to 18	A-4 (00)	ML	0	100	100	99.6	99.5	98.7	94.9	76.4	42.9	20.2	12.1	20.7	16.9	114.2	14.2	2.0
B22-- 18 to 29	A-4 (00)	ML-CL	0	100	98.4	97.7	97.3	96.5	93.6	84.0	56.1	28.2	17.2	23.0	17.7	115.2	15.5	2.0
C1--- 29 to 56	A-4 (00)	ML-CL	0	98.0	96.2	95.7	95.2	94.7	93.2	88.5	61.5	28.9	17.5	23.9	18.8	112.2	15.4	3.0
C2--- 56 to 68	A-4 (00)	ML	0	100	100	99.8	99.8	99.8	99.7	98.7	73.9	33.3	16.0	24.6	20.8	105.9	18.7	1.0
Suncook fine sandy loam: (S79NY-105-003)																		
Ap--- 0 to 8	A-4 (00)	SM	0	100	---	---	100	99.9	97.8	43.6	12.5	4.7	3.0	NP	NP	105.0	15.9	1.0
C1--- 8 to 14	A-2-4(00)	SM	0	100	99.8	99.6	99.2	98.8	83.8	23.0	8.0	3.5	2.5	NP	NP	114.2	12.3	0
C2--- 14 to 35	A-2-4(00)	SM	0	100	99.6	99.2	99.1	98.3	76.9	14.3	---	---	---	NP	NP	115.8	12.3	0
C3--- 35 to 44	A-2-4(00)	SM	0	100	99.0	98.2	97.9	97.4	90.9	22.3	7.3	3.2	2.8	NP	NP	114.9	12.2	0
IIC4- 44 to 52	A-1-q(00)	GW	0	88.8	51.2	37.4	31.0	27.6	14.7	3.0	---	---	---	NP	NP	133.3	7.5	0
Swartswood gravelly loam: (S79NY-105-015)																		
BA--- 1 to 3	A-2-4(00)	GM	0	94.7	76.2	66.7	62.5	60.5	53.6	32.3	17.8	7.9	4.4	NP	NP	108.7	16.3	3.0
Bw1-- 3 to 10	A-4 (00)	SM	0	100	93.3	88.1	81.7	77.0	66.8	41.0	23.8	11.7	6.7	25.6	22.1	116.2	13.7	3.0
Bw2-- 10 to 22	A-4 (00)	SM	0	98.8	94.3	90.1	85.8	80.1	66.8	37.5	22.3	10.6	5.8	17.4	15.0	124.9	9.7	1.6
A2--- 22 to 26	A-2-4(00)	SM	0	94.3	80.3	73.8	68.7	64.3	54.3	32.4	17.5	8.7	5.6	17.0	14.3	128.3	9.3	2.0
Bx--- 26 to 54	A-2-4(00)	SM	0	88.6	75.5	70.0	64.8	60.6	50.8	27.9	14.1	6.8	4.3	NP	NP	132.3	7.5	2.0

See footnote at end of table.

TABLE 18.--ENGINEERING INDEX TEST DATA--Continued

Soil name*, report number, horizon, and depth in inches	Classification		Grain-size distribution											LL	PI	Moisture density		LS
			>3	Percentage passing sieve--							Percentage smaller than--							
	AASHTO	Unified		2 inch	3/4 inch	3/8 inch	No. 4	No. 10	No. 40	No. 200	.02 mm	.005 mm	.002 mm			MD	OM	
			Pct											Pct		Lb/cu ft	Pct	Pct
Wellsboro gravelly loam: (S79NY-105-018)																		
Ap--- 0 to 7	A-4 (00)	OL	0	100	84.7	79.2	74.8	71.9	67.1	56.1	32.8	14.4	7.5	50.7	46.8	92.3	25.0	4.0
Bw1-- 7 to 15	A-4 (00)	ML	0	100	91.6	87.6	84.2	81.7	75.2	61.1	40.2	21.4	12.5	37.5	33.0	95.7	25.0	4.0
Bw2-- 15 to 23	A-4 (00)	SM	0	100	96.1	92.9	89.4	85.7	75.5	48.6	27.0	16.9	9.3	20.2	17.0	120.4	13.7	2.4
Bx--- 23 to 66	A-4 (00)	SM	0	98.4	84.7	79.4	74.9	71.1	62.0	44.0	26.5	14.8	7.5	18.0	14.5	130.0	9.5	2.0
Wurtsboro loam: (S79NY-105-016)																		
Bw1-- 2 to 8	A-4 (00)	ML	0	95.1	92.3	89.9	88.5	87.7	81.8	53.0	26.5	12.6	7.1	NP	NP	109.2	14.8	2.4
Bw2-- 8 to 16	A-4 (00)	ML	0	100	97.9	96.4	95.2	94.0	86.0	53.1	24.9	13.2	8.4	17.1	15.4	121.8	11.2	1.6
Bw3-- 16 to 26	A-4 (00)	SM	0	99.2	94.7	90.6	86.2	82.1	70.2	42.2	20.8	10.5	6.8	14.9	13.5	126.7	10.3	1.6
Bx--- 26 to 58	A-4 (00)	ML	0	100	98.1	97.3	96.5	95.5	88.0	55.1	28.3	14.3	9.3	19.1	17.3	117.3	12.5	1.0

* Locations of the sampled pedons are as follows:

Bash silt loam: town of Fallsburg, 200 yards south of the intersection of Grey Road and Ranch Hill Road.

Lackawanna channery loam: town of Tusten, from intersection of Gable Road and New York Route 97, 100 yards north along New York Route 97, 1.25 miles east along gravel road, 50 feet south of gravel road in a wooded area.

Lordstown silt loam: town of Mamakating, 0.4 mile northeast of the intersection of Masten Lake Road and Callahans Road, 0.25 mile along access road, and 100 feet north of access road.

Oquaga very channery silt loam: town of Bethel, 0.33 mile west of New York Route 17B from the intersection of New York Route 17B and White Lake Road, 0.25 mile north on a gravel road and west 0.25 mile.

Otisville gravelly loamy coarse sand: town of Mamakating, 670 feet southeast of the intersection of Campbell Road and Winterton Road.

Scio silt loam: town of Mamakating, 3/8 mile south of intersection of Bloomingburg Mountain Road and Winterton Road, 35 feet west of electric pole no. 17 on Winterton Road.

Suncook fine sandy loam: town of Fallsburg, 500 yards southeast along the Neversink River from the Hasbrouck A Road bridge, 100 yards northeast.

Swartswood gravelly loam: town of Lumberland, 800 feet west on Proctor Road from the intersection of Proctor Road and Mohaph Road, 40 feet south of Proctor Road.

Wellsboro gravelly loam: town of Bethel, 1/2 mile south of White Lake along New York Route 55, 400 feet southeast of the intersection of New York Route 55 and Bethel Town Road No. 80.

Wurtsboro loam: town of Lumberland, 3.5 miles south from the intersection of Proctor Road (County Route 32) and Hollow Road, 1.2 miles west of Hollow Road on Black Forest Road.

TABLE 19.--RELATIONSHIPS BETWEEN SOIL CHARACTERISTICS AND PARENT MATERIAL, LANDSCAPE POSITION, TEMPERATURE REGIME, AND DRAINAGE OF SOILS

Soil characteristics and parent material*	Excessively drained	Somewhat excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
	SOILS THAT FORMED IN GLACIAL TILL ON UPLANDS						
Very deep, moderately coarse textured and medium textured, brownish soils; formed in glacial till derived from sandstone, siltstone, and shale			Valdis			Neversink	Neversink
Very deep, moderately coarse textured and medium textured, reddish brown soils; formed in glacial till derived from sandstone, siltstone, and shale							
Mesic			Cheshire				
Frigid			Elka				
Very deep, moderately coarse textured and medium textured, brownish soils; formed in glacial till derived from sandstone, conglomerate, and shale							
Fragipan at a depth of 20 to 36 inches			Swartswood				
Fragipan at a depth of 17 to 28 inches				Wurtsboro			
Fragipan at a depth of 12 to 18 inches					Scriba		
Very deep, medium textured, reddish brown soils; formed in glacial till derived from sandstone, siltstone, and shale							
Fragipan at a depth of 17 to 36 inches			Lackawanna				
Fragipan at a depth of 15 to 26 inches				Wellsboro			
Fragipan at a depth of 10 to 22 inches					Morris		

See footnote at end of table.

TABLE 19.--RELATIONSHIPS BETWEEN SOIL CHARACTERISTICS AND PARENT MATERIAL, LANDSCAPE POSITION, TEMPERATURE REGIME, AND DRAINAGE OF SOILS--Continued

Soil characteristics and parent material*	Excessively drained	Somewhat excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
	SOILS THAT FORMED IN GLACIAL TILL ON UPLANDS						
Very deep, moderately coarse textured and medium textured, reddish brown soils; formed in glacial till derived from sandstone, siltstone, and shale; frigid							
Fragipan at a depth of 20 to 36 inches			Lewbeach				
Fragipan at a depth of 15 to 26 inches				Willowemoc			
Fragipan at a depth of 12 to 22 inches					Onteora		
No fragipan, but substratum is firm						Suny	Suny
Very deep, medium textured and moderately fine textured, brownish and grayish soils; formed in glacial till derived from siltstone, shale, and sandstone							Alden
Very deep, medium textured, brownish soils; formed in glacial till derived from shale, siltstone, and sandstone; fragipan at a depth of 14 to 26 inches				Mardin			
Moderately deep, medium textured, brownish soils; formed in glacial till derived from shale, siltstone, and sandstone							
Skeletal	Manlius	Manlius	Manlius				
Nonskeletal			Lordstown		Tuller	Tuller	
Moderately deep, medium textured and moderately coarse textured, reddish brown soils; formed in glacial till derived from sandstone, siltstone, and shale							
Mesic, skeletal	Oquaga	Oquaga	Oquaga				
Frigid, nonskeletal			Mongaup	Mongaup	Torull	Torull	

See footnote at end of table.

TABLE 19.--RELATIONSHIPS BETWEEN SOIL CHARACTERISTICS AND PARENT MATERIAL, LANDSCAPE POSITION, TEMPERATURE REGIME, AND DRAINAGE OF SOILS--Continued

Soil characteristics and parent material*	Excessively drained	Somewhat excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
	SOILS THAT FORMED IN GLACIAL TILL ON UPLANDS						
Shallow, medium textured, reddish brown and brown soils; formed in glacial till derived from sandstone, siltstone, and shale							
Mesic		Arnot	Arnot	Arnot			
Frigid		Hawksnest	Hawksnest		Tuller	Tuller	
	SOILS THAT FORMED IN LACUSTRINE DEPOSITS ON LAKE PLAINS						
Very deep, medium textured, brownish soils; formed in glaciolacustrine deposits			Unadilla	Scio	Raynham	Raynham	
Very deep, medium textured, brownish soils; formed in glaciolacustrine deposits; fragipan at a depth of 12 to 24 inches					Wallington		
	SOILS THAT FORMED IN GLACIAL OUTWASH ON OUTWASH PLAINS, TERRACES, AND KAMES						
Very deep, medium textured and moderately coarse textured, reddish brown soils; formed in glaciofluvial material		Tunkhannock	Tunkhannock				
Very deep, medium textured and moderately coarse textured, brownish soils; formed in glaciofluvial material		Chenango	Chenango		Red Hook		
Very deep, moderately coarse textured, brownish soils; formed in glaciofluvial materials			Riverhead	Pompton	Pompton		
Very deep, coarse textured, brownish soils; formed in glaciofluvial material	Otisville						

See footnote at end of table.

TABLE 19.--RELATIONSHIPS BETWEEN SOIL CHARACTERISTICS AND PARENT MATERIAL, LANDSCAPE POSITION, TEMPERATURE REGIME, AND DRAINAGE OF SOILS--Continued

Soil characteristics and parent material*	Excessively drained	Somewhat excessively drained	Well drained	Moderately well drained	Somewhat poorly drained	Poorly drained	Very poorly drained
	SOILS THAT FORMED IN ALLUVIAL MATERIALS ON FLOOD PLAINS						
Very deep, medium textured, reddish brown soils; formed in alluvial sediments			Barbour		Bash		
Very deep, medium textured, brownish soils; formed in alluvial sediments			Pope	Philo		Wayland	Wayland
Very deep, coarse textured, brownish soils; formed in alluvial sediments	Suncook						
Very deep, coarse textured to moderately fine textured, brown and gray soils; formed in alluvial sediments	Udifluvents	Udifluvents	Udifluvents	Udifluvents	Fluvaquents	Fluvaquents	Fluvaquents
	SOILS THAT FORMED IN ORGANIC MATERIAL IN BOGS AND SWAMPS						
Organic material more than 51 inches thick							
Mesic							Carlisle
Frigid							Greenwood
Organic material 16 to 51 inches thick over loamy mineral material							
Mesic							Palms
Frigid							Osipee
	SOILS THAT FORMED IN MIXED SOIL MATERIAL DERIVED FROM GLACIAL TILL AND GLACIAL OUTWASH						
Deep, medium textured to coarse textured material mixed by human activities	Udorthents	Udorthents	Udorthents	Udorthents			

*Where the temperature regime is not shown, the soil series is in the mesic temperature regime.

TABLE 20.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
*Alden	Fine-loamy, mixed, nonacid, mesic Mollic Haplaquepts
Arnot	Loamy-skeletal, mixed, mesic Lithic Dystrochrepts
Barbour	Coarse-loamy over sandy or sandy-skeletal, mixed, mesic Fluventic Dystrochrepts
Bash	Coarse-loamy, mixed, mesic Fluvaquentic Dystrochrepts
Carlisle	Euic, mesic Typic Medisaprists
Chenango	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Cheshire	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Elka	Coarse-loamy, mixed, frigid Typic Dystrochrepts
Fluvaquents	Fluvaquents
Greenwood	Dysic Typic Borohemists
Hawksnest	Loamy, mixed, frigid Lithic Dystrochrepts
Lackawanna	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Lewbeach	Coarse-loamy, mixed, frigid Typic Fragiochrepts
Lordstown	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Manlius	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Mardin	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Mongaup	Coarse-loamy, mixed, frigid Typic Dystrochrepts
Morris	Coarse-loamy, mixed, mesic Aeric Fragiaquepts
Neversink	Coarse-loamy, mixed, acid, mesic Aeric Haplaquepts
Onteora	Coarse-loamy, mixed, frigid Aquic Fragiochrepts
Oquaga	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Ossipee	Loamy, mixed, dysic Terric Borohemists
Otisville	Sandy-skeletal, mixed, mesic Typic Udorthents
Palms	Loamy, mixed, euic, mesic Terric Medisaprists
Philo	Coarse-loamy, mixed, mesic Fluvaquentic Dystrochrepts
Pompton	Coarse-loamy, mixed, mesic Aquic Dystrochrepts
Pope	Coarse-loamy, mixed, mesic Fluventic Dystrochrepts
Raynham	Coarse-silty, mixed, nonacid, mesic Aeric Haplaquepts
*Red Hook	Coarse-loamy, mixed, nonacid, mesic Aeric Haplaquepts
Riverhead	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Scio	Coarse-silty, mixed, mesic Aquic Dystrochrepts
Scriba	Coarse-loamy, mixed, mesic Aeric Fragiaquepts
Suncook	Mixed, mesic Typic Udipsamments
Suny	Coarse-loamy, mixed, acid, frigid Aeric Haplaquepts
Swartswood	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Torull	Loamy, mixed, acid, frigid Lithic Haplaquepts
Tuller	Loamy, mixed, acid, mesic Lithic Haplaquepts
Tunkhannock	Loamy-skeletal, mixed, mesic Typic Dystrochrepts
Udifluvents	Udifluvents
Udorthents	Udorthents
Unadilla	Coarse-silty, mixed, mesic Typic Dystrochrepts
Valois	Coarse-loamy, mixed, mesic Typic Dystrochrepts
Wallington	Coarse-silty, mixed, mesic Aeric Fragiaquepts
Wayland	Fine-silty, mixed, nonacid, mesic Mollic Fluvaquents
Wellsboro	Coarse-loamy, mixed, mesic Typic Fragiochrepts
Willowemoc	Coarse-loamy, mixed, frigid Typic Fragiochrepts
Wurtsboro	Coarse-loamy, mixed, mesic Typic Fragiochrepts

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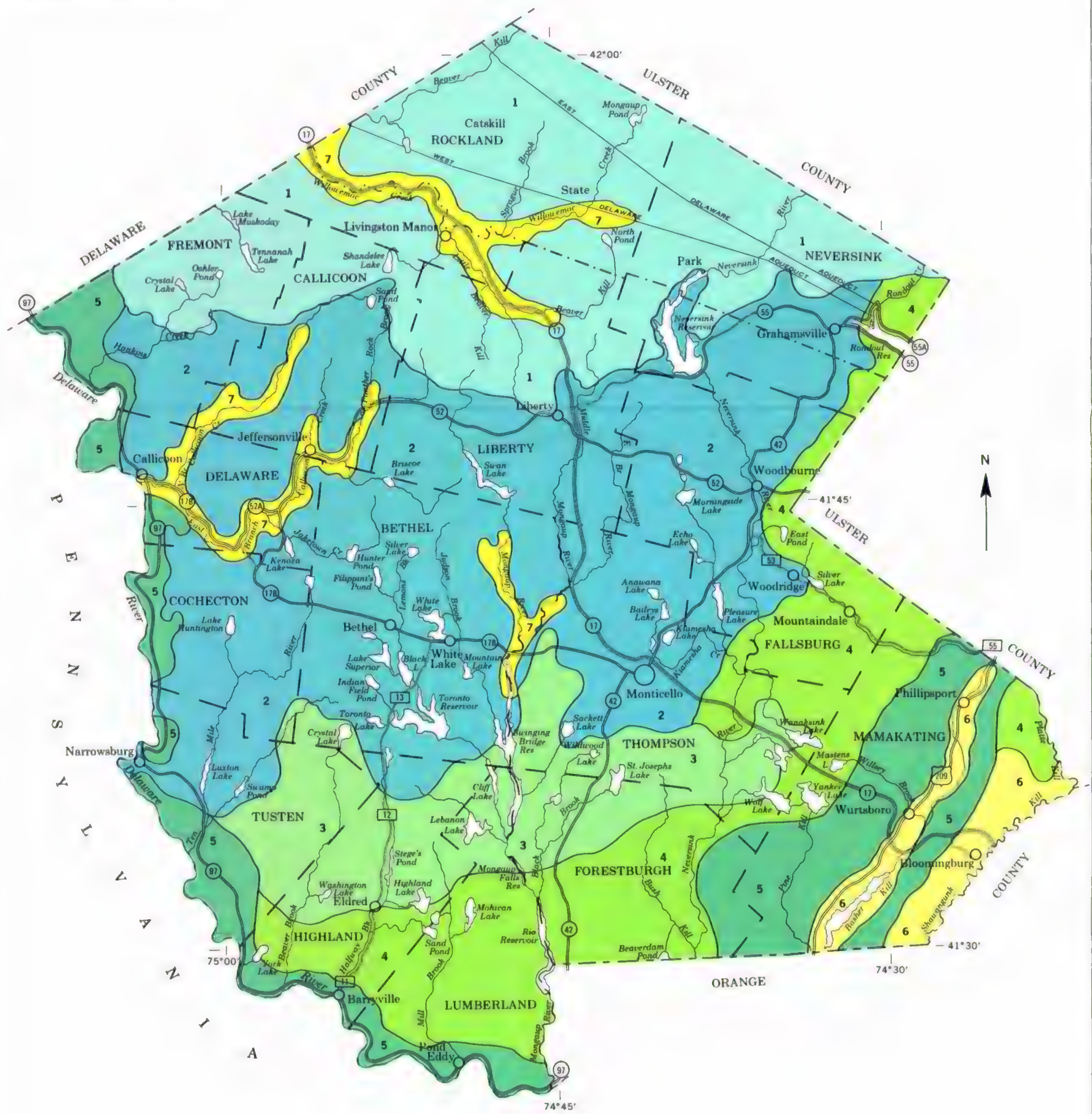
NRCS Accessibility Statement

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.



LEGEND*

1	WILLOWEMOC-MONGAUP-LEWBEACH: Nearly level to very steep, moderately deep and very deep, moderately well drained and well drained, medium textured soils; on uplands in the area of the Catskill Mountains
2	WELLSBORO-OQUAGA-LACKAWANNA: Nearly level to very steep, very deep and moderately deep, moderately well drained to excessively drained, medium textured soils; on uplands
3	WELLSBORO-WURTSBORO-MORRIS: Nearly level to strongly sloping, very deep, moderately well drained and somewhat poorly drained, medium textured, extremely stony, stony, and nonstony soils; on uplands
4	WURTSBORO-SWARTSWOOD: Nearly level to steep, very deep, moderately well drained and well drained, medium textured soils; on uplands
5	ARNOT-LORDSTOWN: Nearly level to very steep, shallow and moderately deep, somewhat excessively drained to well drained, medium textured soils; on uplands
6	VALOIS-CHENANGO-RIVERHEAD: Nearly level to very steep, very deep, well drained and somewhat excessively drained, moderately coarse textured and medium textured soils; in valleys
7	CHESHIRE-TUNKHANNOCK: Nearly level to very steep, very deep, well drained and somewhat excessively drained, medium textured soils; in valleys and on valley sides

*The texture given in the descriptive heading of each map unit refers to the surface layer of the major soils in that map unit.

COMPILED 1987

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
CORNELL UNIVERSITY AGRICULTURAL EXPERIMENT STATION

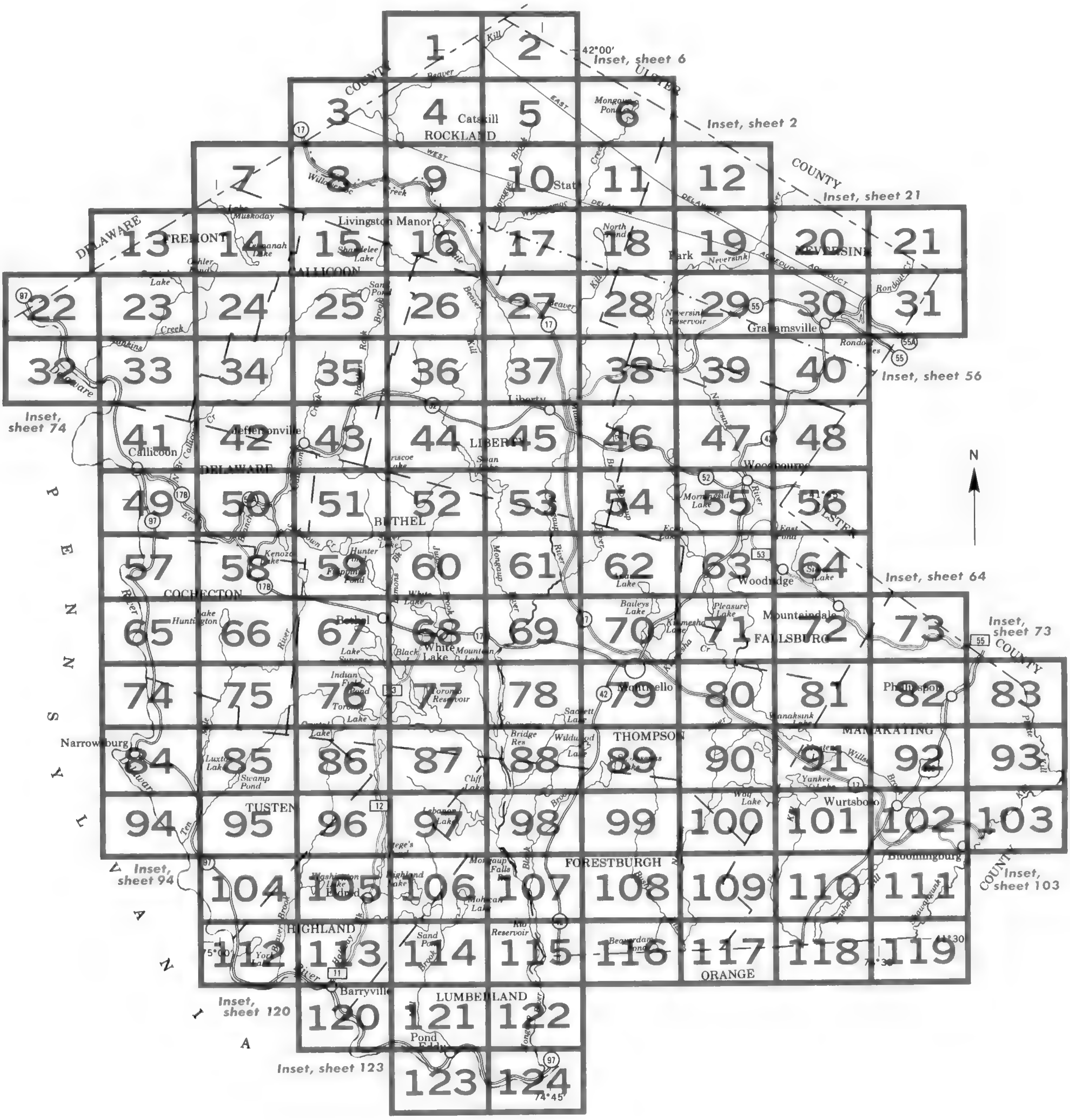
GENERAL SOIL MAP

SULLIVAN COUNTY, NEW YORK

Scale 1:253,440

1 0 1 2 3 4 Mi

1 0 4 8 Km



INDEX TO MAP SHEETS

SULLIVAN COUNTY, NEW YORK

Scale 1:253,440

1 0 1 2 3 4 Mi

1 0 4 8 Km

Original text from each individual map sheet read:
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are controlled photomosaics prepared from 1977 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL LEGEND

Map symbols consist of a combination of letters. The first capital letter is the initial one of the map unit name. The lowercase letter that follows separates map units having names that begin with the same letter, except that it does not separate slope phases. The second capital letter indicates the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas.

SYMBOL	NAME
Ad	Alden silt loam
AlC	Arnot-Lordstown complex, 0 to 15 percent slopes, very rocky
AlE	Arnot-Lordstown complex, 15 to 35 percent slopes, very rocky
AoC	Arnot-Oquaga complex, 0 to 15 percent slopes, very rocky
AoE	Arnot-Oquaga complex, 15 to 35 percent slopes, very rocky
ArC	Arnot-Rock outcrop complex, 0 to 15 percent slopes
ArE	Arnot-Rock outcrop complex, 15 to 35 percent slopes
ArF	Arnot-Rock outcrop complex, 35 to 70 percent slopes
Bb	Barbour loam
Bs	Bash silt loam
Ca	Carlisle muck
Ce	Carlisle, Palms and Alden soils, ponded
ChA	Chenango gravelly loam, 0 to 3 percent slopes
ChB	Chenango gravelly loam, 3 to 8 percent slopes
ChC	Chenango gravelly loam, 8 to 15 percent slopes
ChD	Chenango gravelly loam, 15 to 25 percent slopes
CsB	Cheshire channery loam, 3 to 8 percent slopes, stony
CsC	Cheshire channery loam, 8 to 15 percent slopes, stony
CsD	Cheshire channery loam, 15 to 25 percent slopes, stony
CsE	Cheshire channery loam, 25 to 35 percent slopes, stony
CsF	Cheshire channery loam, 35 to 60 percent slopes, stony
ElB	Elka loam, 3 to 8 percent slopes, bouldery
ElC	Elka loam, 8 to 15 percent slopes, bouldery
ElD	Elka loam, 15 to 25 percent slopes, bouldery
ElE	Elka loam, 25 to 35 percent slopes, bouldery
ElF	Elka loam, 35 to 50 percent slopes, bouldery
Fu	Fluvaquents-Udifluvents complex, frequently flooded
Gn	Greenwood peat
HaC	Hawksnest-Mongaup loams, strongly sloping, very rocky
HaE	Hawksnest-Mongaup loams, steep, very rocky
HeF	Hawksnest-Mongaup-Rock outcrop complex, very steep
LaB	Lackawanna channery loam, 3 to 8 percent slopes
LaC	Lackawanna channery loam, 8 to 15 percent slopes
LaD	Lackawanna channery loam, 15 to 25 percent slopes
LeB	Lewbeach silt loam, 3 to 8 percent slopes
LeC	Lewbeach silt loam, 8 to 15 percent slopes
LeD	Lewbeach silt loam, 15 to 25 percent slopes
LfE	Lewbeach silt loam, steep, very stony
LfF	Lewbeach silt loam, very steep, very stony
LoB	Lordstown silt loam, 3 to 8 percent slopes, stony
LrC	Lordstown-Arnot complex, 8 to 15 percent slopes, very stony
MaB	Manlius channery silt loam, 3 to 8 percent slopes
MaC	Manlius channery silt loam, 8 to 15 percent slopes
MaD	Manlius channery silt loam, 15 to 25 percent slopes
MdB	Mardin gravelly silt loam, 3 to 8 percent slopes
MdC	Mardin gravelly silt loam, 8 to 15 percent slopes
MnB	Mongaup loam, 3 to 8 percent slopes, very stony
MnC	Mongaup loam, 8 to 15 percent slopes, very stony
MnD	Mongaup loam, 15 to 25 percent slopes, very stony
MrA	Morris loam, 0 to 3 percent slopes
MrB	Morris loam, 3 to 8 percent slopes
MrC	Morris loam, 8 to 15 percent slopes
Ne	Neversink loam
Nf	Neversink and Alden soils, very stony
OaA	Onteora loam, 0 to 3 percent slopes
OaB	Onteora loam, 3 to 8 percent slopes
OaC	Onteora loam, 8 to 15 percent slopes
ObB	Onteora loam, 2 to 8 percent slopes, very stony
OeB	Oquaga very channery silt loam, 3 to 8 percent slopes
OgC	Oquaga-Arnot complex, 8 to 15 percent slopes
OgD	Oquaga-Arnot complex, 15 to 25 percent slopes
Os	Ossipee muck
OtA	Otisville gravelly loamy coarse sand, 0 to 3 percent slopes
OtB	Otisville gravelly loamy coarse sand, 3 to 8 percent slopes
OtC	Otisville gravelly loamy coarse sand, 8 to 15 percent slopes
OtD	Otisville gravelly loamy coarse sand, 15 to 25 percent slopes
Pa	Palms muck
Pe	Philo silt loam
Pg	Pits, gravel
Ph	Pits, quarry
PmA	Pompton gravelly fine sandy loam, 0 to 3 percent slopes
PmB	Pompton gravelly fine sandy loam, 3 to 8 percent slopes
Po	Pope silt loam, occasionally flooded
Pp	Pope very fine sandy loam, rarely flooded
Ra	Raynham silt loam
Re	Red Hook sandy loam
RhA	Riverhead sandy loam, 0 to 3 percent slopes
RhB	Riverhead sandy loam, 3 to 8 percent slopes
RhC	Riverhead sandy loam, 8 to 15 percent slopes
SaB	Scio silt loam, 2 to 6 percent slopes
ScA	Scriba loam, 0 to 3 percent slopes, stony
ScB	Scriba loam, 3 to 8 percent slopes, stony
SeB	Scriba and Morris loams, gently sloping, extremely stony
Sn	Suncook fine sandy loam
So	Suny fine sandy loam
Sp	Suny fine sandy loam, very stony
SrB	Swartswood gravelly loam, 3 to 8 percent slopes, stony
SrC	Swartswood gravelly loam, 8 to 15 percent slopes, stony
SrD	Swartswood gravelly loam, 15 to 25 percent slopes, stony
StE	Swartswood and Lackawanna soils, 25 to 35 percent slopes, stony
SwE	Swartswood and Lackawanna soils, steep, very stony
SwF	Swartswood and Lackawanna soils, very steep, very stony
TaB	Torull-Rock outcrop complex, 1 to 5 percent slopes
TeB	Tuller-Rock outcrop complex, 1 to 5 percent slopes
TkA	Tunkhannock gravelly loam, 0 to 3 percent slopes
TkB	Tunkhannock gravelly loam, 3 to 8 percent slopes
TkC	Tunkhannock gravelly loam, 8 to 15 percent slopes
TkD	Tunkhannock gravelly loam, 15 to 25 percent slopes
ToE	Tunkhannock and Otisville soils, steep
ToF	Tunkhannock and Otisville soils, very steep
Ud	Udorthents, smoothed
UnA	Unadilla silt loam, 0 to 2 percent slopes
UnB	Unadilla silt loam, 2 to 6 percent slopes
VaB	Valois gravelly sandy loam, 3 to 8 percent slopes
VaC	Valois gravelly sandy loam, 8 to 15 percent slopes
VaD	Valois gravelly sandy loam, 15 to 25 percent slopes
VaE	Valois gravelly sandy loam, 25 to 35 percent slopes
VaF	Valois gravelly sandy loam, 35 to 50 percent slopes
Wa	Wallington silt loam
Wd	Wayland silt loam
WeA	Wellsboro gravelly loam, 0 to 3 percent slopes
WeB	Wellsboro gravelly loam, 3 to 8 percent slopes
WeC	Wellsboro gravelly loam, 8 to 15 percent slopes
WlC	Wellsboro and Wurtsboro soils, strongly sloping, extremely stony
WmA	Willowemoc silt loam, 0 to 3 percent slopes
WmB	Willowemoc silt loam, 3 to 8 percent slopes
WmC	Willowemoc silt loam, 8 to 15 percent slopes
WoC	Willowemoc silt loam, strongly sloping, very stony
WuA	Wurtsboro loam, 0 to 3 percent slopes, stony
WuB	Wurtsboro loam, 3 to 8 percent slopes, stony
WuC	Wurtsboro loam, 8 to 15 percent slopes, stony
W	Water

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

BOUNDARIES

- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)

- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK

LAND DIVISION CORNER (sections and land grants)

ROADS

- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS

- Interstate
- Federal
- State
- County, farm or ranch

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES

- Without road
- With road
- With railroad

DAMS

- Large (to scale)
- Medium or Small

PITS

- Gravel pit or G.P.
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES

- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label)
- Located object (label)
- Tank (label)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE

- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS

- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES

- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS

ESCARPMENTS

- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

GULLY

DEPRESSION OR SINK

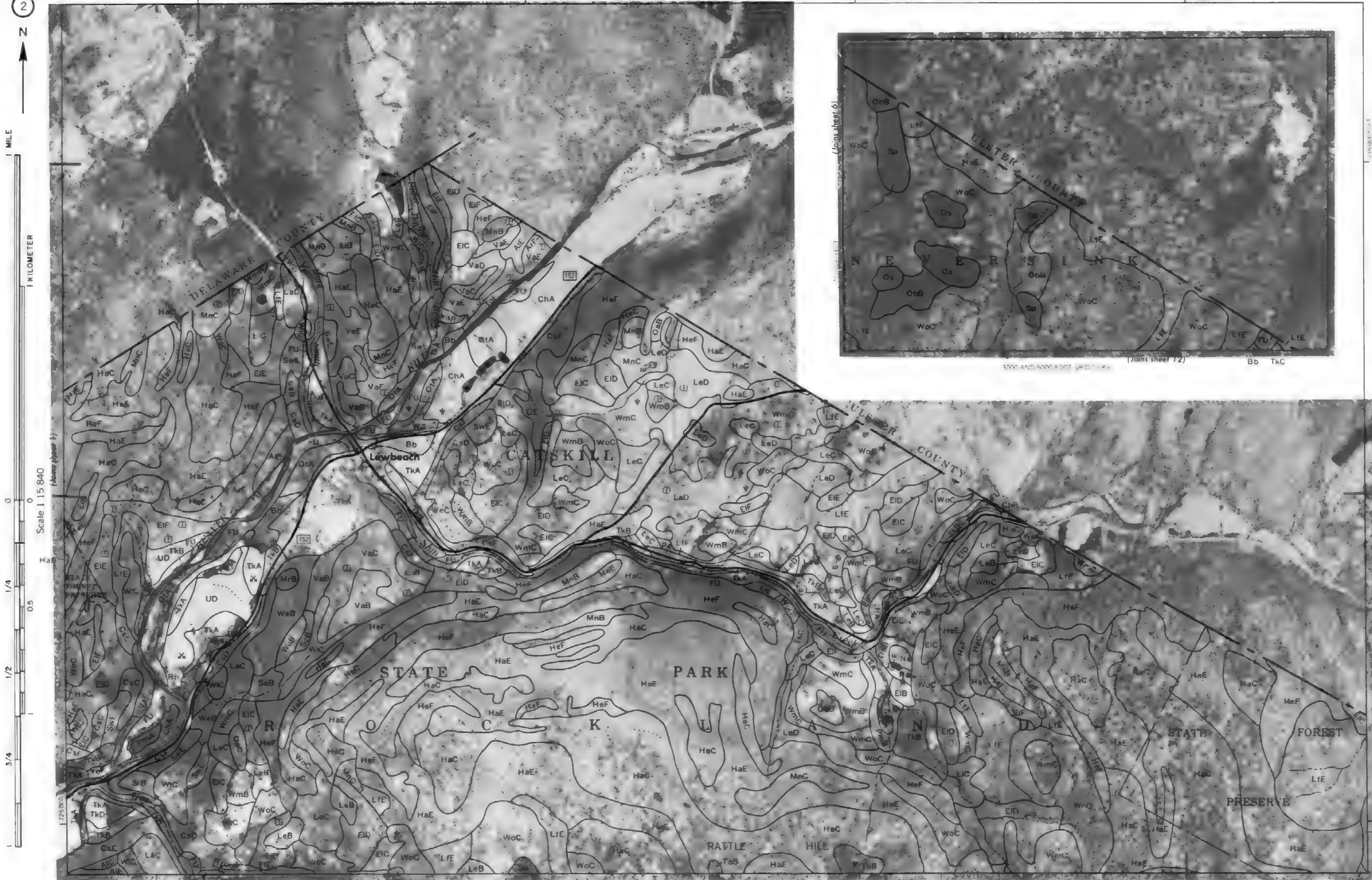
SOIL SAMPLE (normally not shown)

MISCELLANEOUS

- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot
- Borrow or B.P.

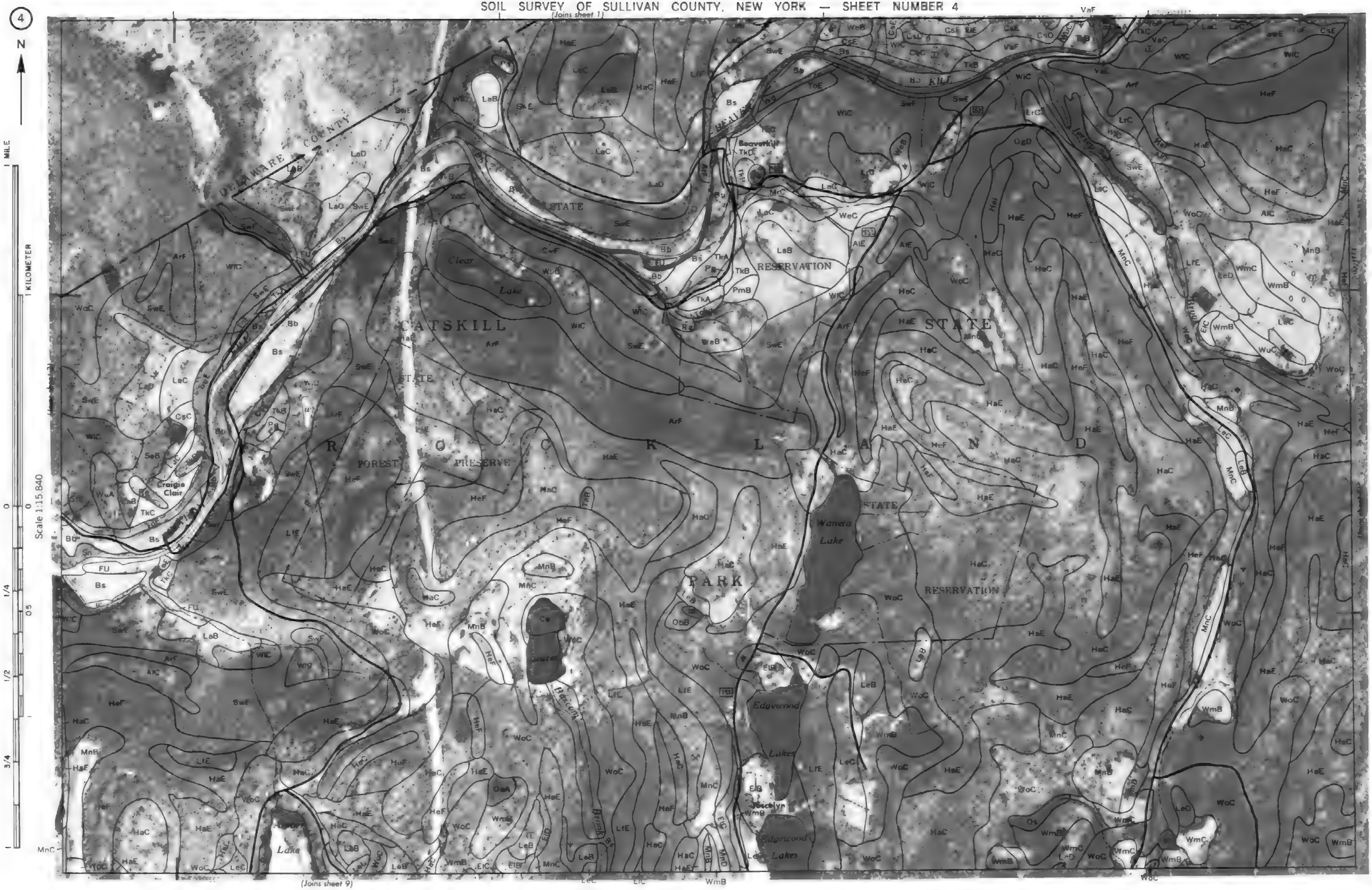

355 000 FEET
1
N
MILE
KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
DELAWARE COUNTY
CATSKILL STATE FOREST PRESERVE
ROCKLAND
STATE PARK
BEAVER
152
(Joins sheet 4)

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 2



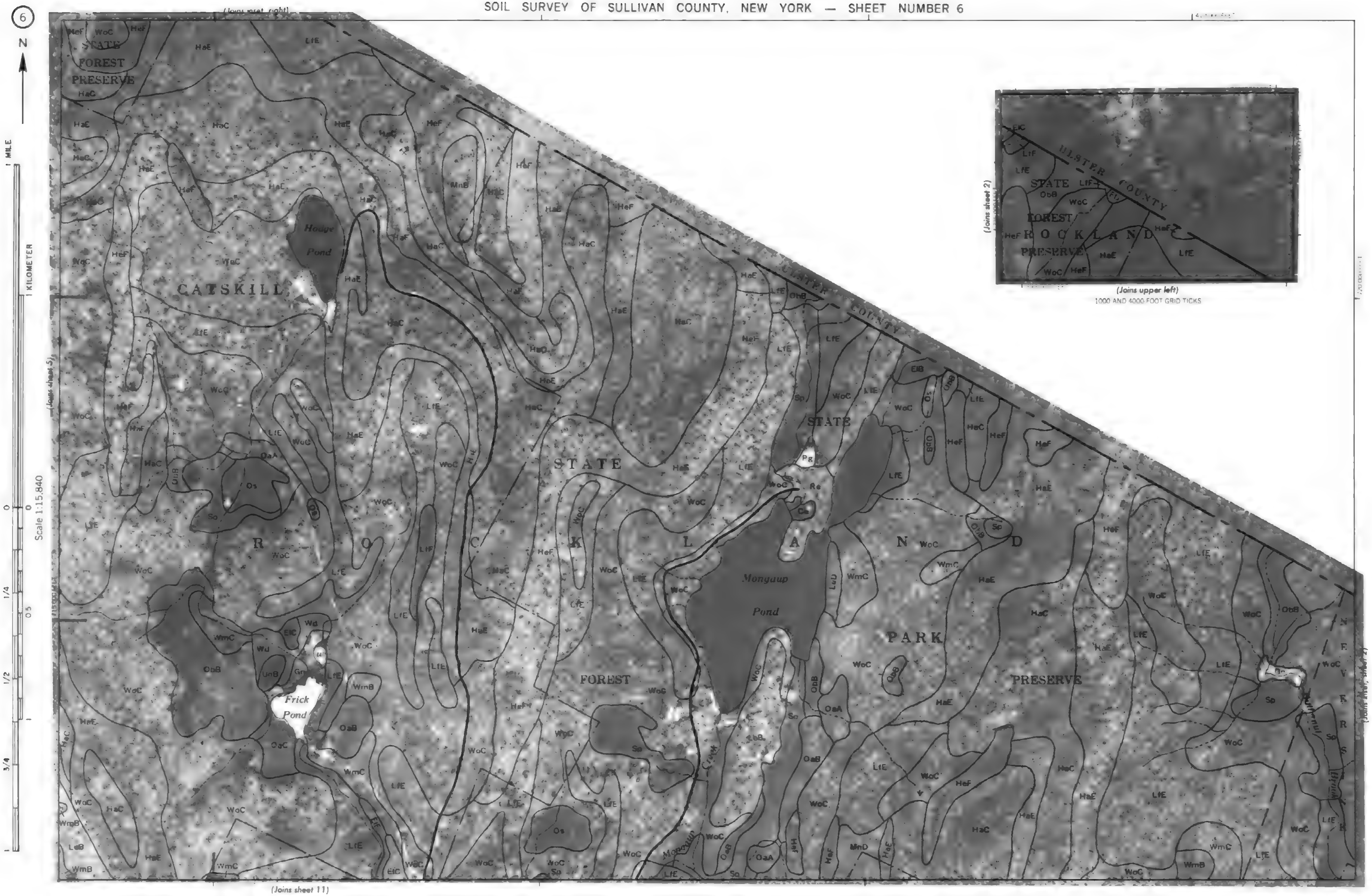

3
N
1 MILE
1 KILOMETER
Scale 1:15,840
DELAWARE COUNTY
CATSKILL
STATE
PARK
ROCKLAND
BURNT HILL
(Joins sheet 8)
HeF
SwE
WlC
AlE
HaC
HaE
SwF
ArF
WoC
LfE
WmB
WmC
SwE
Sn
Bb
MnB
MnC
TaB
ObB
LeC
Ud
OtA
WeC
AlC

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 4



5


(Joins sheet 2)
(Joins sheet 6)
(Joins sheet 10)
RATTLE HILL
CATSKILL
ROCKLAND
STATE
PARK
STATE FOREST PRESERVE
Quick Lake
Forest Lake
Lake Uncas
Orchard Lake
Brook
N
1 MILE
1 KILOMETER
Scale 1:15 840

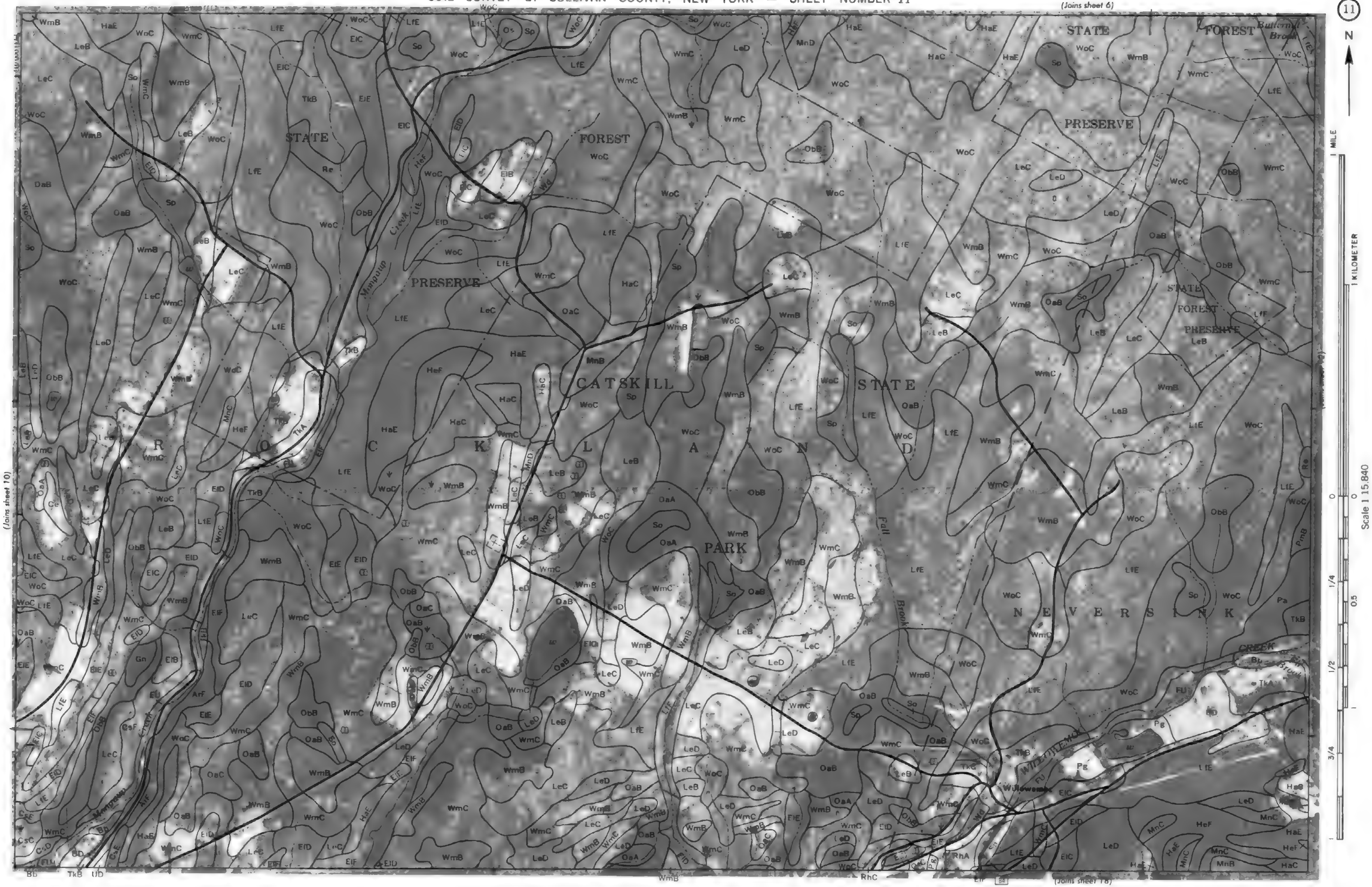

6
N
1 MILE
1 KILOMETER
Scale 1:15,840
0
1/4
1/2
3/4
1
0.5
(Joins inset, right)
(Joins sheet 5)
(Joins sheet 11)
(Joins sheet 2)
(Joins upper left)
1000 AND 4000 FOOT GRID TICKS
CATSKILL STATE FOREST PRESERVE
STATE FOREST PRESERVE
ROCKLAND
ULSTER COUNTY
NEVERSINK RIVER
Hodge Pond
Frick Pond
Mongaup Pond
Mongaup Creek
Willowemoc
HaE
HaC
HeF
WoC
LfE
OaA
OaB
ObB
Os
So
Sp
WmC
WmB
Wd
ElC
UnB
LuD
MnD
MnB
Pg
Re
Ce
Gn
LeB
HaD

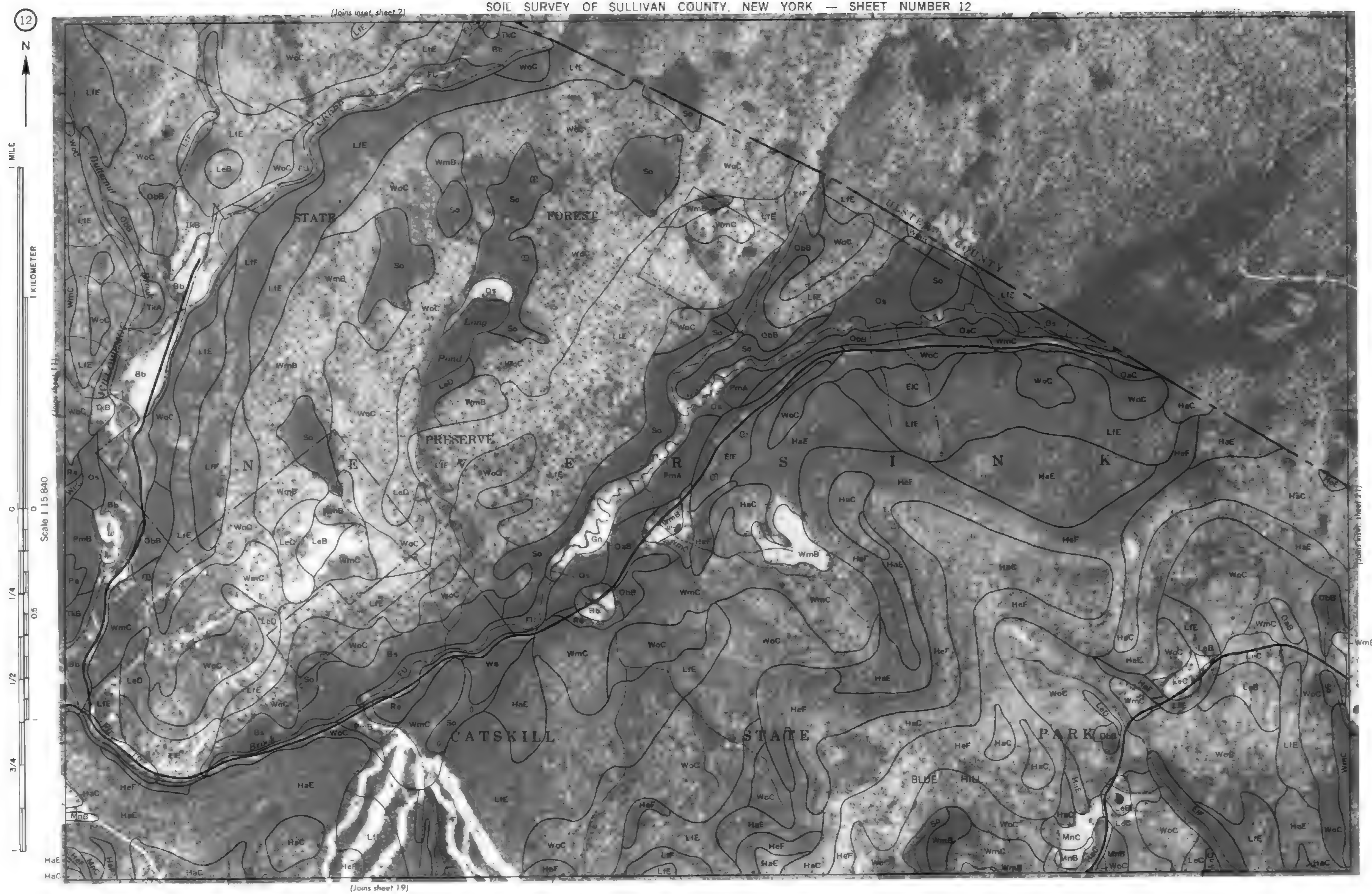
SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 7

(Joins sheet 3) SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 8

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 9

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 10


11
(Joins sheet 6)
(Joins sheet 10)
(Joins sheet 18)
N
STATE FOREST PRESERVE
CATSKILL STATE PARK
ROCKLAND
NEVERSINK
CREEK
Mongaup Creek
Fall Brook
Willowemoc
WILLOWEMOC
1 MILE
1 KILOMETER
Scale 1:15,840

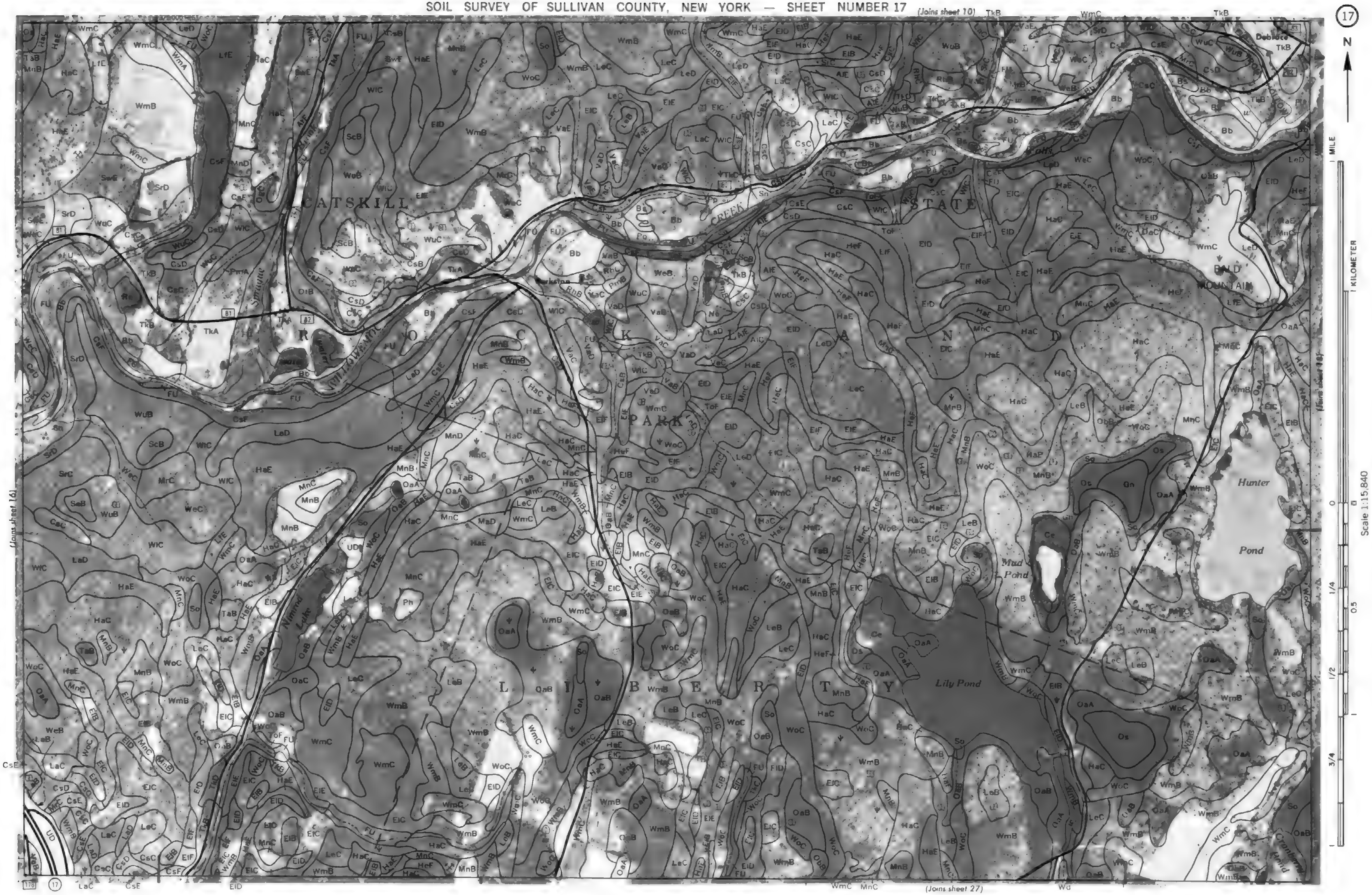

12
N
(Joins inset, sheet 2)
(Joins sheet 19)
1 MILE
1 KILOMETER
Scale 1:15 840
STATE FOREST PRESERVE
NEVERSINK
CATSKILL STATE PARK
ULSTER COUNTY
Long Pond
BLUE HILL


13
N
DELAWARE COUNTY
Glen Lake
(Joins sheet 23)
1 MILE
1 KILOMETER
Scale 1:15,840

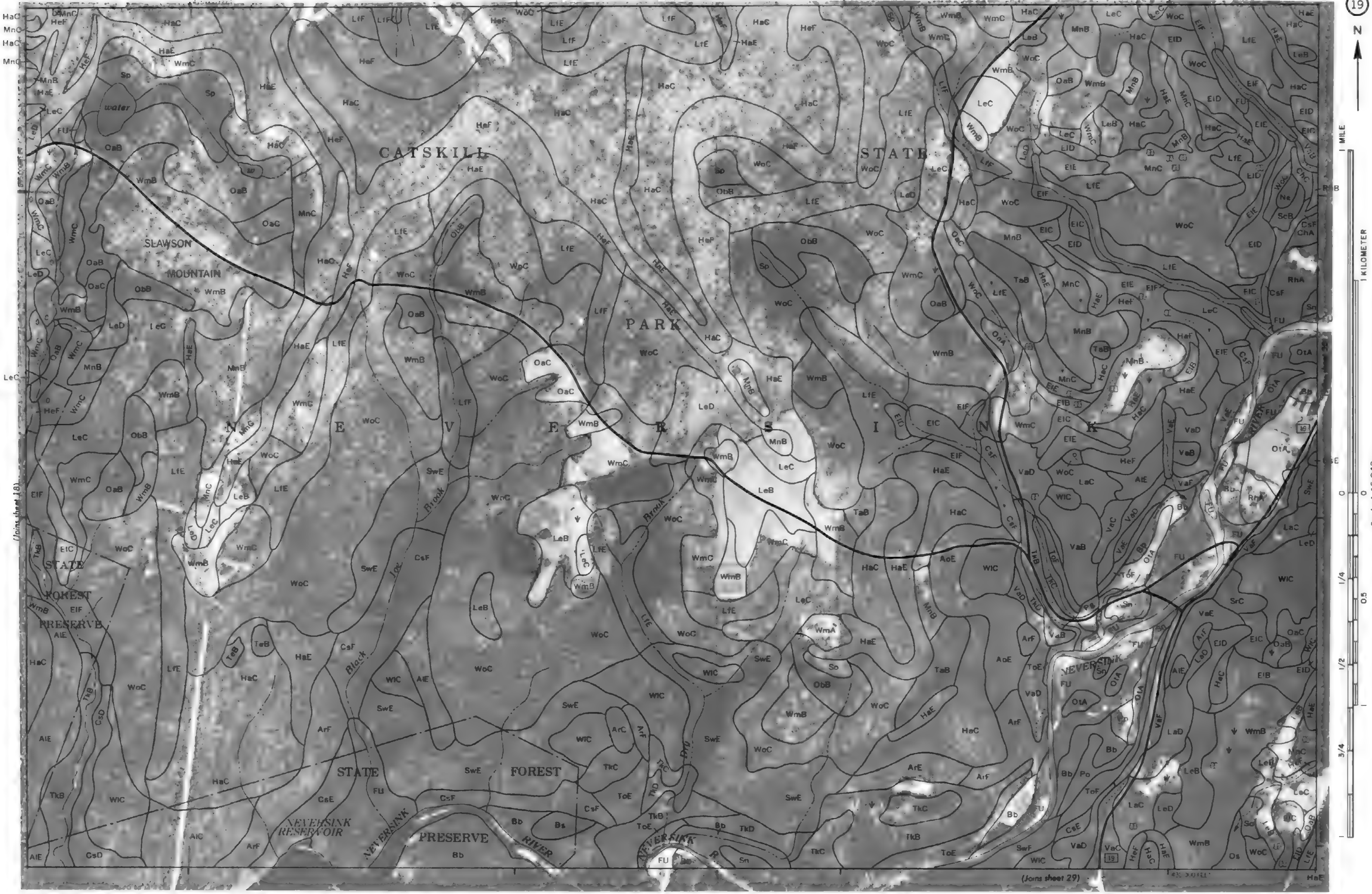

N
DELAWARE COUNTY
(Joins sheet 7)
(Joins sheet 24)
1 MILE
1 KILOMETER
Scale 1:15,840
Tennanah Lake
Basket Lake
Lake Florence
Mud Pond
Tennanah Lake

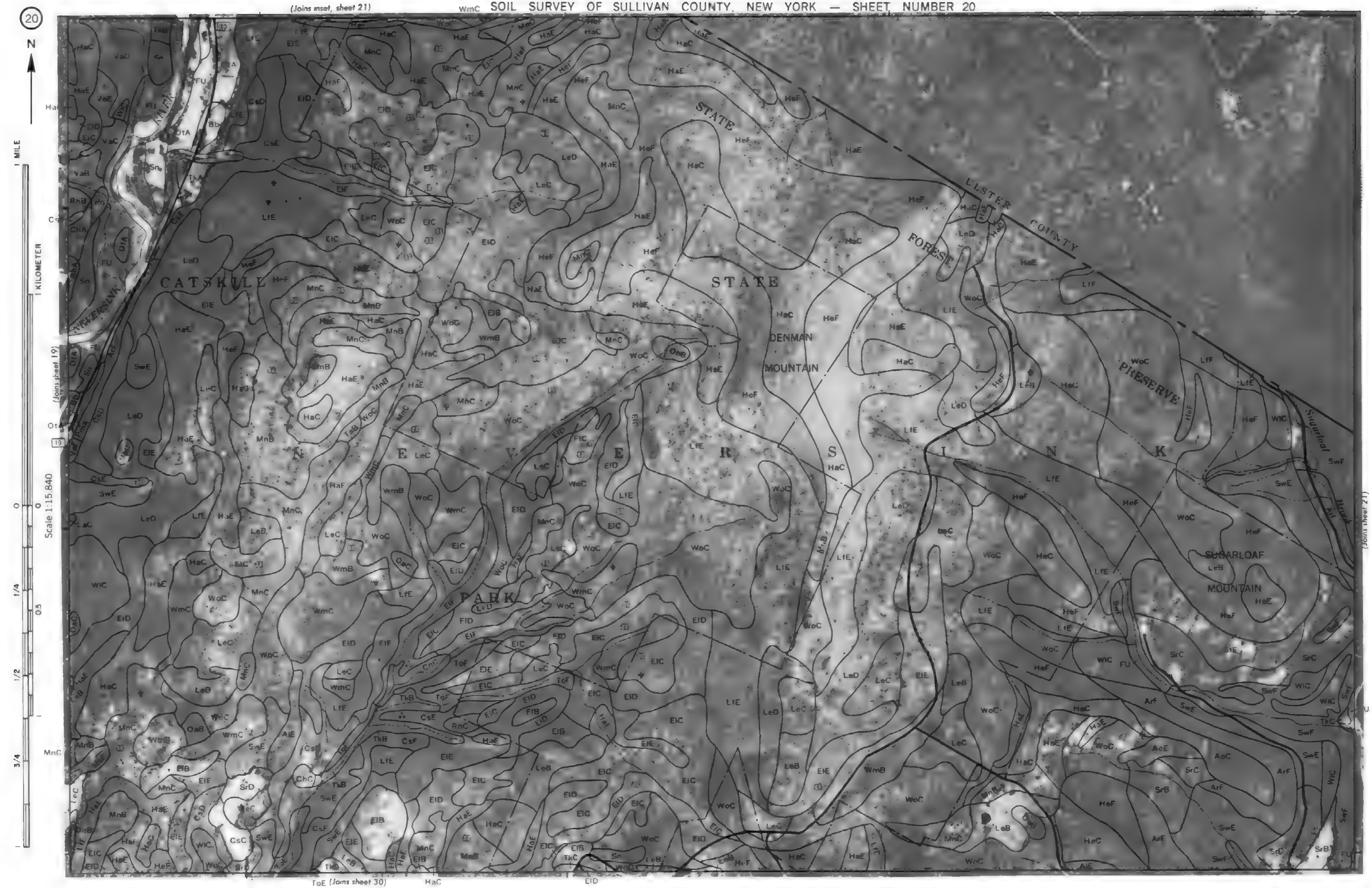
SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 15

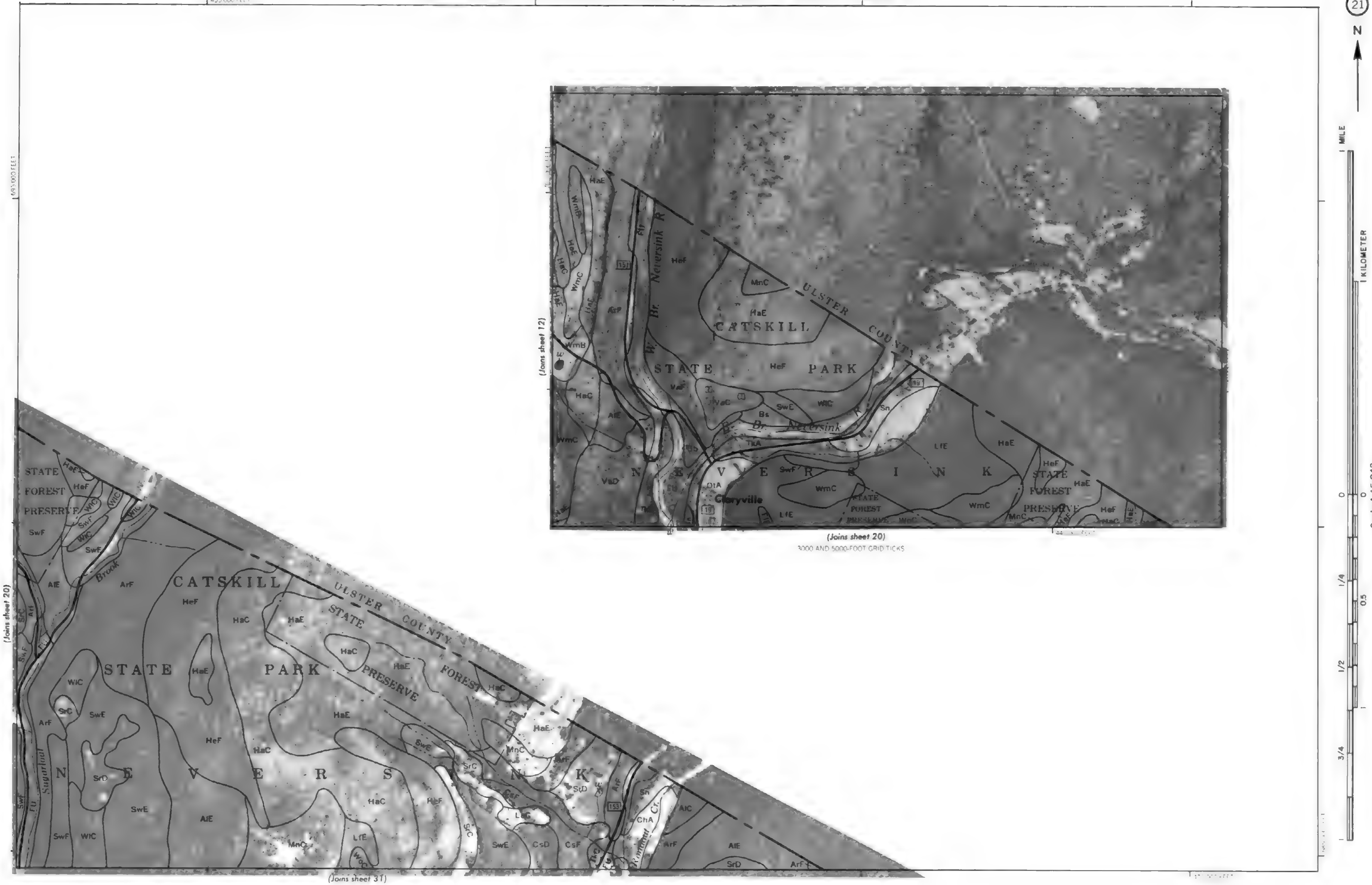

16
N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 9)
(Joins sheet 15)
(Joins sheet 17)
(Joins sheet 26)
CATSKILL STATE PARK
ROUND TOP
LIVINGSTON MANOR
LIVINGSTON MANOR AIRPORT
ROCKLAND
CALLICOON
LIBERTY
Shandelee
Shandelee Lake
Willowemoc Creek
Little Beaver Kill
Beaver Kill


17
(Joins sheet 10)
(Joins sheet 16)
(Joins sheet 18)
(Joins sheet 27)
N
1 MILE
1 KILOMETER
Scale 1:15,840
CATSKILL STATE PARK
LIBERTY
WILLOWEMOC CREEK
BALD MOUNTAIN
Parksville
Debruce
Hunter Pond
Lily Pond
Mud Pond
Nimrod Lake

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 18


19
N
CATSKILL
STATE
PARK
N E V E R S I N K
SLAWSON
MOUNTAIN
STATE
FOREST
PRESERVE
STATE
FOREST
PRESERVE
NEVERSINK
RESERVOIR
NEVERSINK
RIVER
NEVERSINK
Joe Brook
Black Brook
(Joins sheet 18)
(Joins sheet 29)
1 MILE
1 KILOMETER
Scale 1:15 840


20
N
(Joins inset, sheet 21)
(Joins sheet 19)
(Joins sheet 27)
(Joins sheet 30)
CATSKILL STATE FOREST PRESERVE PARK
STATE FOREST
ULSTER COUNTY
DENMAN MOUNTAIN
SUGARLOAF MOUNTAIN
Sugarloaf Brook
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5

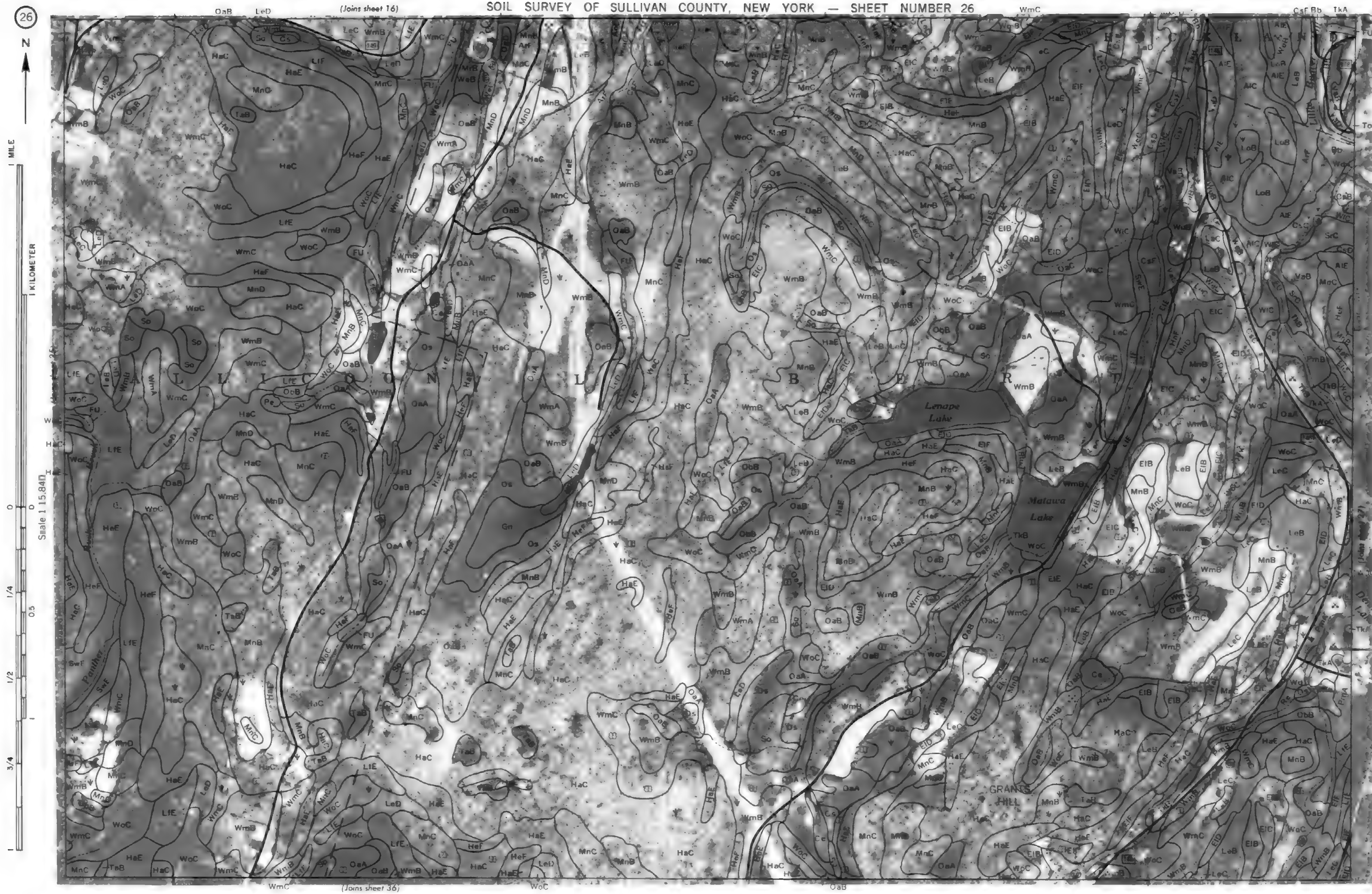

21
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
(Joins sheet 12)
(Joins sheet 20)
3000 AND 5000-FOOT GRID TICKS
(Joins sheet 20)
(Joins sheet 31)
CATSKILL
STATE
PARK
NEVERSINK
STATE FOREST PRESERVE
ULSTER COUNTY
W. Br. Neversink R.
Claryville
Sugarloaf
Brook
Rondout Cr.
HeF
HaE
HaC
MnC
WmC
WlC
SwE
SwF
ArF
AlE
SrC
SrD
LfE
OtA
CsD
CsF
ChA
AlC
StD


22
N
1 MILE
1 KILOMETER
Scale 1:15,840
DELAWARE COUNTY
SAM MILLER HILL
Long Eddy
HAWKS NEST
WAYNE COUNTY
DELAWARE RIVER
PENNSYLVANIA
North Branch
Basket Creek
(Joins sheet 23)
(Joins sheet 32)


(Joins sheet 13)
23
N
Fernwood
Crystal Lake
STATE RESERVATION
water
East Branch
F R E M O N T
Fremont Center
(Joins sheet 22)
(Joins sheet 33)
24
1 MILE
1 KILOMETER
Scale 1:15,840

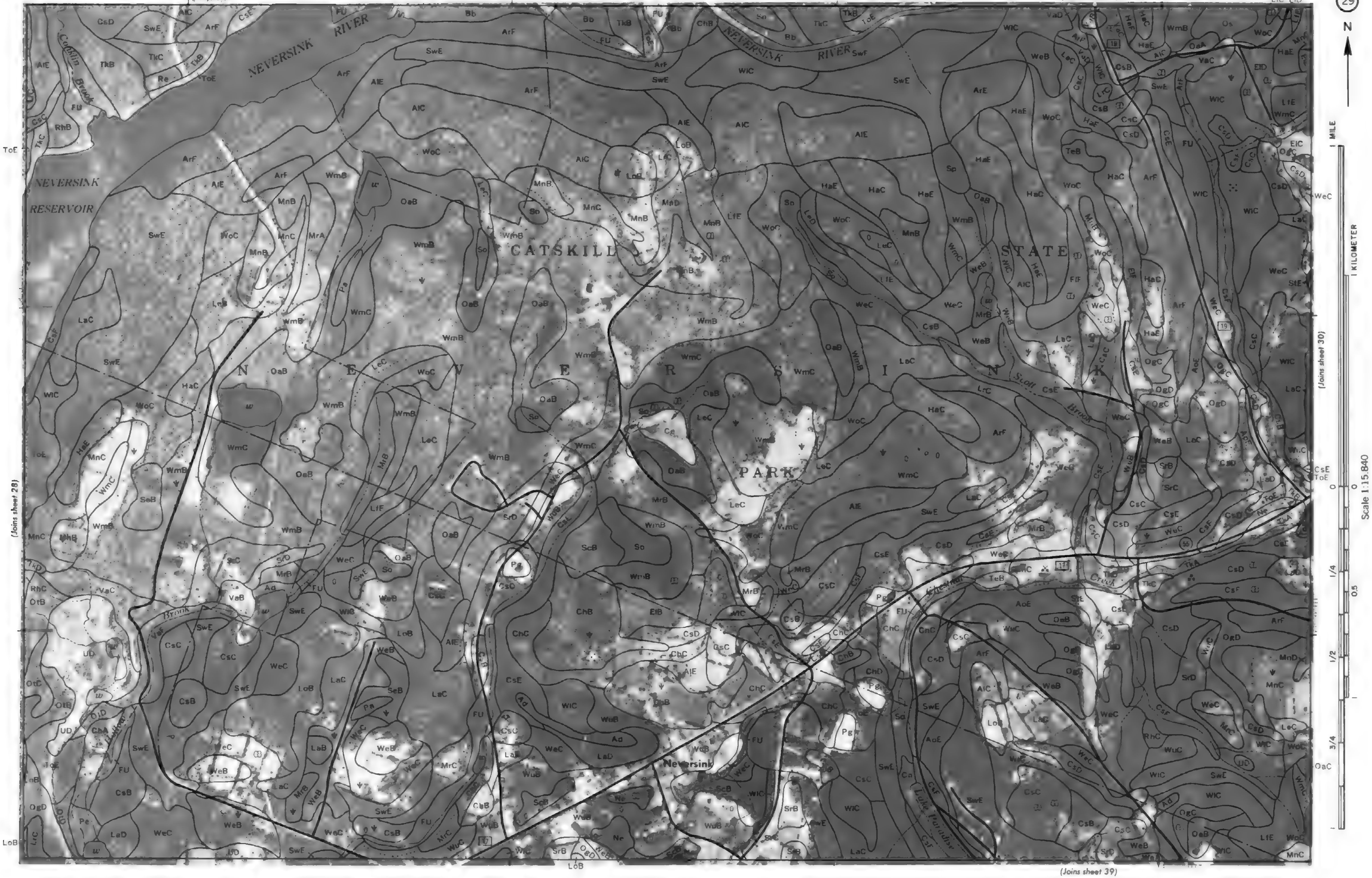
SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 24

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 25


26
N
1 MILE
1 KILOMETER
Scale 1:15,840
0
1/4
0.5
1/2
3/4
1
(Joins sheet 16)
(Joins sheet 36)
CALLICOON
LIBERTY
Lenape Lake
Mataw a Lake
GRANTS HILL
Panther


(Joins sheet 17)
(Joins sheet 26)
(Joins sheet 28)
(Joins sheet 37)
375 000 FEET
ROCKLAND
LIBERTY
Olympus Lake
Pearl Lake
Cranberry Pond
Denman Lake
Parksville
BENTON HOLLOW
ROUTE 17 EXPRESSWAY
Beaver
water
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 28


29
(Joins sheet 19)
(Joins sheet 28)
(Joins sheet 30)
(Joins sheet 39)
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0.5
NEVERSINK RIVER
NEVERSINK RESERVOIR
CATSKILL
STATE
N E V E R S I N K
PARK
Neversink
Coalin Brook
Scott Brook
Chestnut Creek
Lake Paradise
Brook
19
55
17


30
N
1 MILE
1 KILOMETER
Scale 1:15,840
(Joins sheet 20)
(Joins sheet 29)
(Joins sheet 31)
(Joins sheet 40)
CATSKILL
STATE
PARK
Unionville
Grahamsville
Lowes Corners
THUNDER HILL
RONDOUT RESERVOIR


(Joins sheet 21)
(Joins sheet 30)
(Joins inset, sheet 56)
31
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
ULSTER COUNTY
CATSKILL STATE PARK
RONDOUT RESERVOIR
Rondout

(Joins sheet 22)

32

N

1 MILE

1 KILOMETER

Scale 1:15 840

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 33

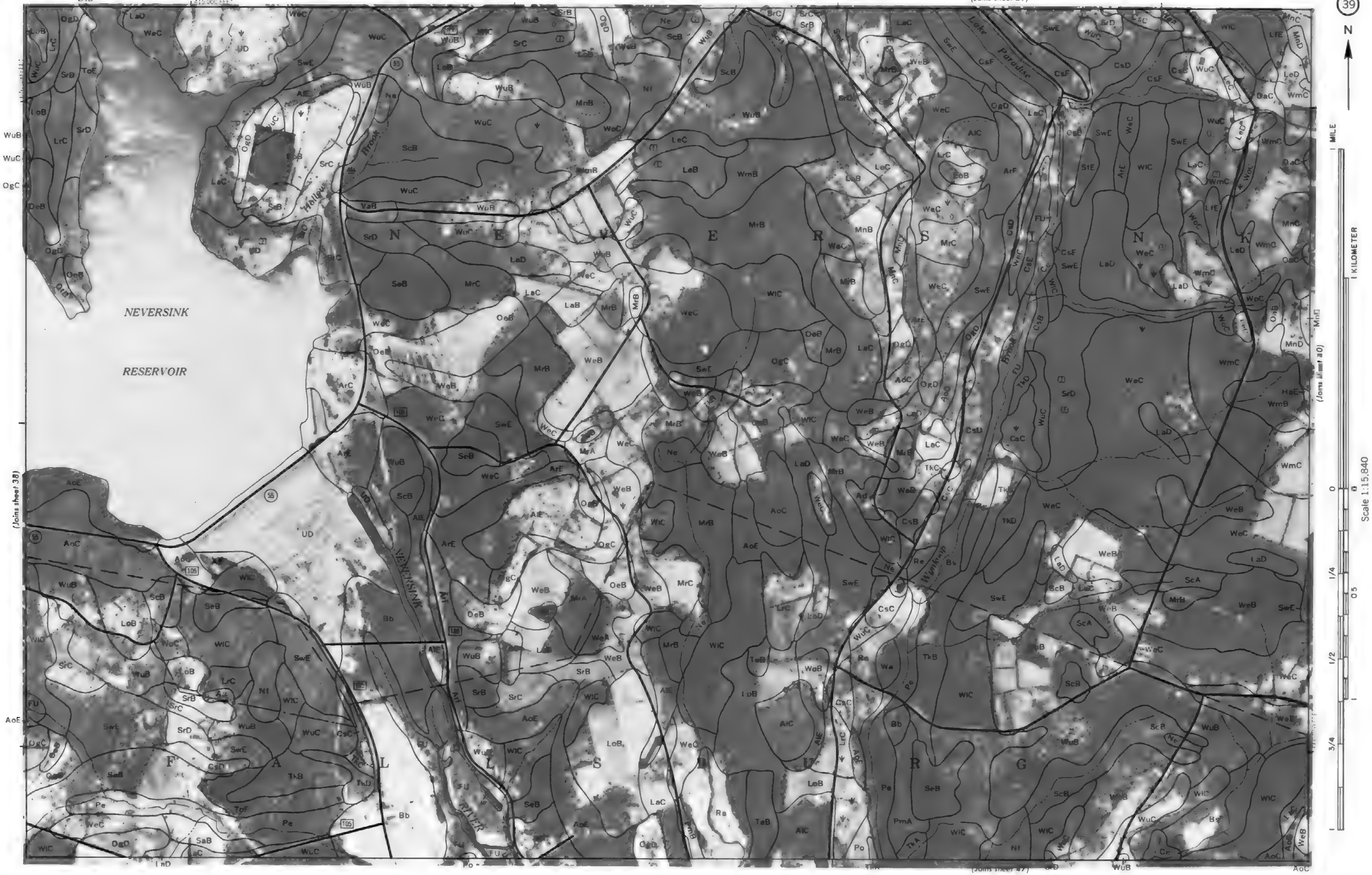
SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 34


(Joins sheet 25)
(Joins sheet 43)
35
N
Stump Pond
HILL SIXTEEN
Hust Pond
water
Youngsville
Brook
1 MILE
1 KILOMETER
Scale 1:15,840
0
1/4
1/2
3/4
0.5


36
N
(Joins sheet 26)
(Joins sheet 37)
(Joins sheet 44)
1 MILE
1 KILOMETER
Scale 1:15 840
Pine Swamp
KROM HOLLOW
Brook
water


(Joins sheet 27)
(Joins sheet 36)
(Joins sheet 38)
(Joins sheet 45)
37
N
Revonah Lake
REVONAH HILL
LIBERTY
MILE
KILOMETER
Scale 1:15 840


38
N
(Joins sheet 28)
(Joins sheet 46)
NEVERSINK
RESERVOIR
N E V E R S I N K
F A L L S B U R G
1 MILE
1 KILOMETER
Scale 1:15 840


(Joins sheet 29)
(Joins sheet 38)
(Joins sheet 30)
(Joins sheet 47)
39
N
NEVERSINK
RESERVOIR
NEVERSINK
RIVER
Lake Paradise
Brook
Hollow
Wynkoop
N E V E R S I N K
F A L L S B U R G
1 MILE
1 KILOMETER
Scale 1:15,840
0
1/4
1/2
3/4
0.5

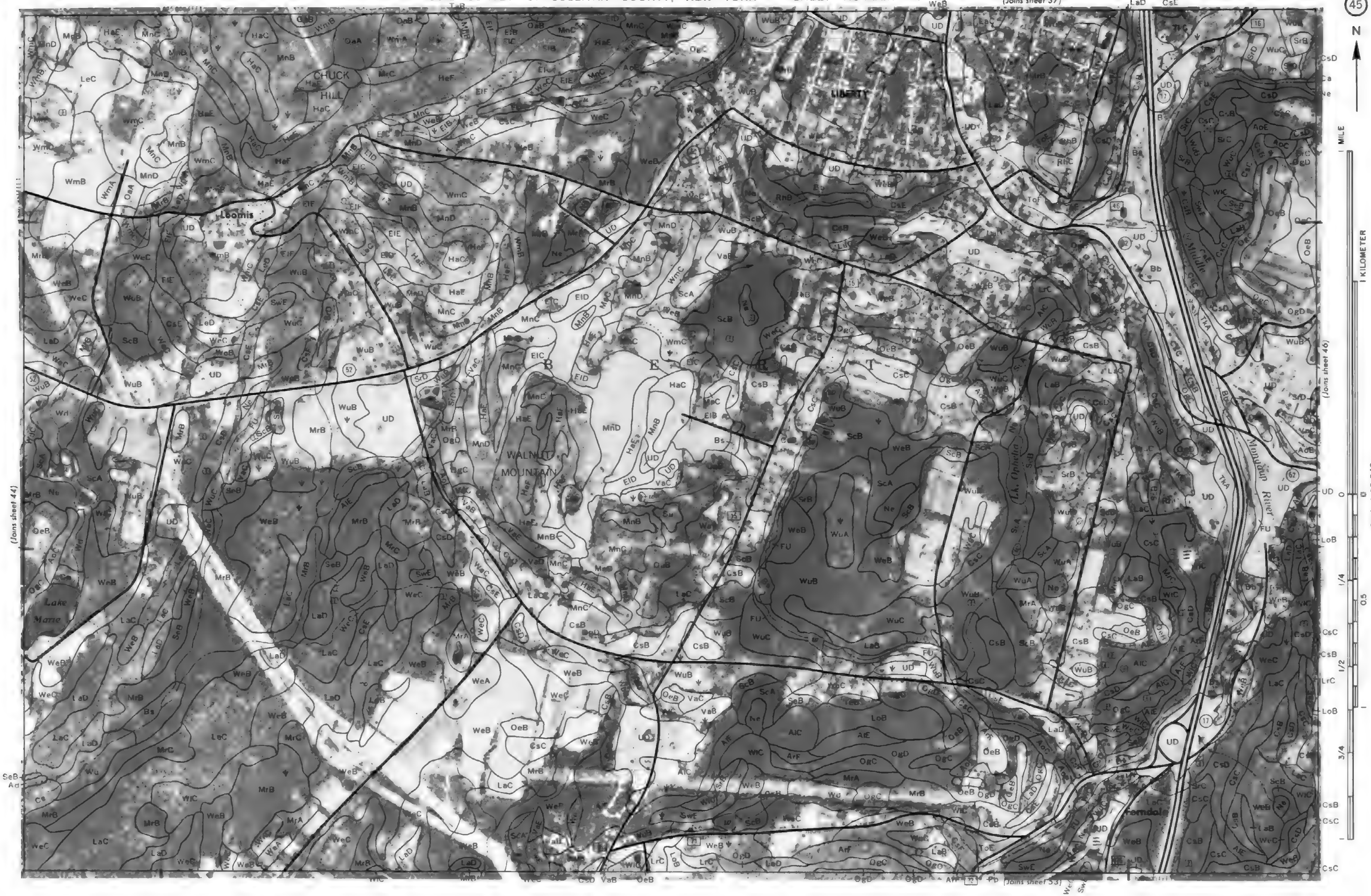

40
(Joins sheet 30)
(Joins sheet 39)
(Joins sheet 41)
(Joins sheet 48)
THUNDER HILL
CATSKILL
STATE
PARK
N E V E R S I N K
SOUTH HILL
RONDOUT RESERVOIR
Beaverdam Pond
FALLSBURG
ULSTER COUNTY
N
1 MILE
1 KILOMETER
Scale 1:15 840


(Joins sheet 33)
(Joins sheet 42)
(Joins sheet 49)
(Joins inset, sheet 74)
41
N
DELAWARE RIVER
PENNSYLVANIA
WAYNE COUNTY
CONRAIL
DELAWARE RIVER
WAYNE COUNTY
PENNSYLVANIA
North Branch
Callicoon Creek
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1


42
N
(Joins sheet 34)
(Joins sheet 41)
(Joins sheet 43)
(Joins sheet 50)
330 000 FEET
1 MILE
1 KILOMETER
Scale 1:15 840
FREMONT
CALLICOON
DELAWARE
Upper Beechwoods

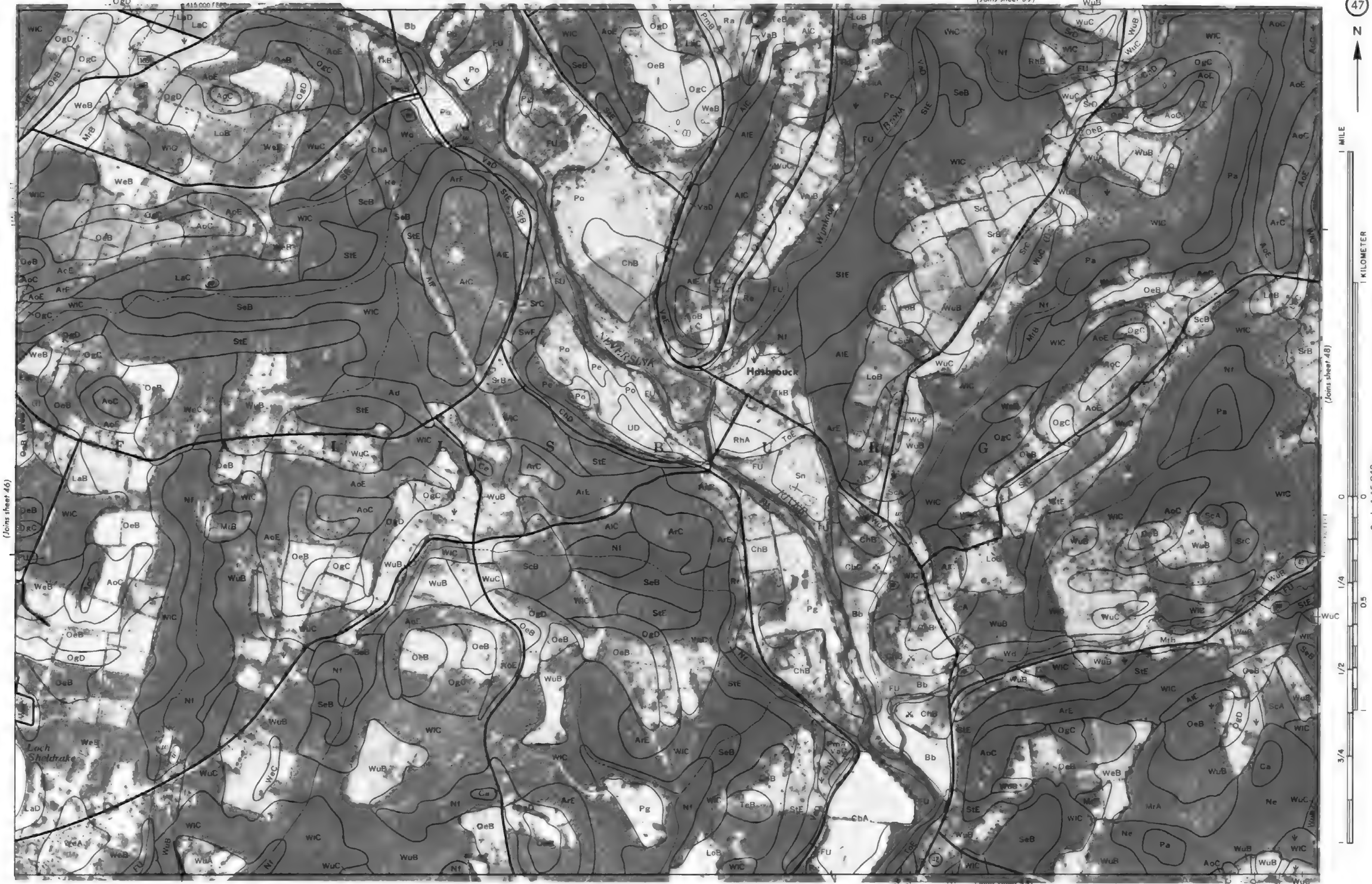

43
N
(Joins sheet 35)
(Joins sheet 42)
(Joins sheet 44)
(Joins sheet 51)
EAST HILL
BIRCH RIDGE
SWISS HILL
Jeffersonville
Lake Jefferson
Mill Pond
Laundry Brook
Callicoon Creek
East Branch
D E L A W A R E
C OL L I C O O N
B E T H E L
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1


44
N
(Joins sheet 36)
(Joins sheet 52)
MILE
KILOMETER
Scale 1:15 840
Swan Lake
Lake Marie
HOLLOW
L I B E R T Y

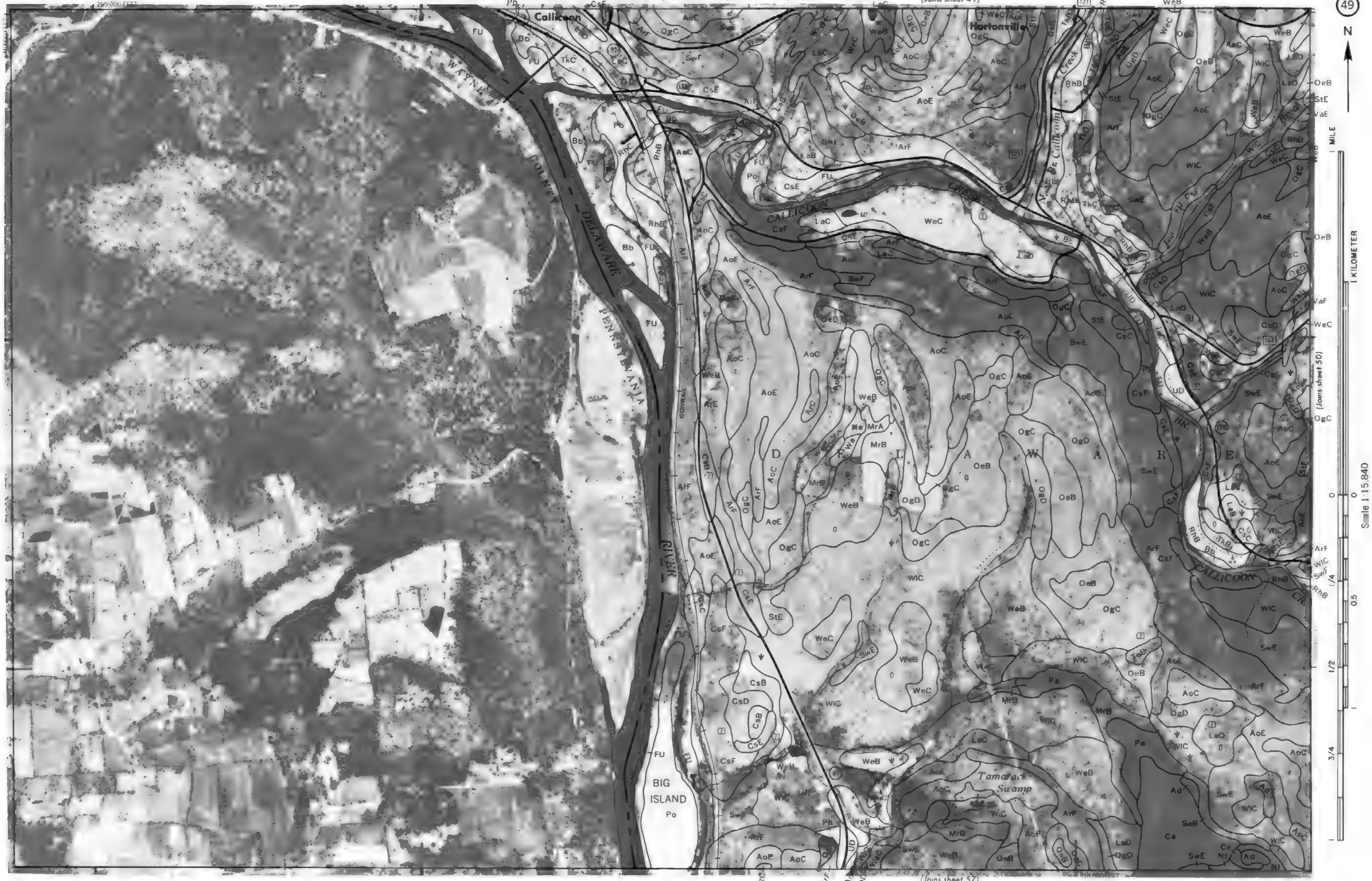

45
N
(Joins sheet 37)
(Joins sheet 46)
(Joins sheet 44)
(Joins sheet 53)
CHUCK HILL
Loomis
LIBERTY
WALNUT MOUNTAIN
Lake Mane
Lk. Ophelia
Mongaup River
Ferndale
1 MILE
1 KILOMETER
Scale 1:15 840


46
N
(Joins sheet 38)
(Joins sheet 45)
(Joins sheet 47)
(Joins sheet 54)
1 MILE
1 KILOMETER
Scale 1:15 840
LIBERTY AIRPORT
Grossingers Lake
Sunset Lake
LIBERTY MUNICIPAL PARK
Dixie Lake
F A L L S B U R G
Divine Corners
Hilldale Pond
Loch Sheldrake
Luzon Lake

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 47




48
N
(Joins sheet 40)
(Joins sheet 47)
(Joins sheet 56)
F A L L S B U R G
N E V E R S I N K
STATE
FOREST
PRESERVE
ULSTER COUNTY
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
0.5
1/2
3/4
1


49
N
Callicoon
Hortonville
WAYNE COUNTY
PENNSYLVANIA
DELAWARE RIVER
CALLICOON CREEK
N. Br. Callicoon Creek
D E L A W A R E
BIG ISLAND
Tamarack Swamp
(Joins sheet 50)
(Joins sheet 57)
1 MILE
1 KILOMETER
Scale 1:15,840

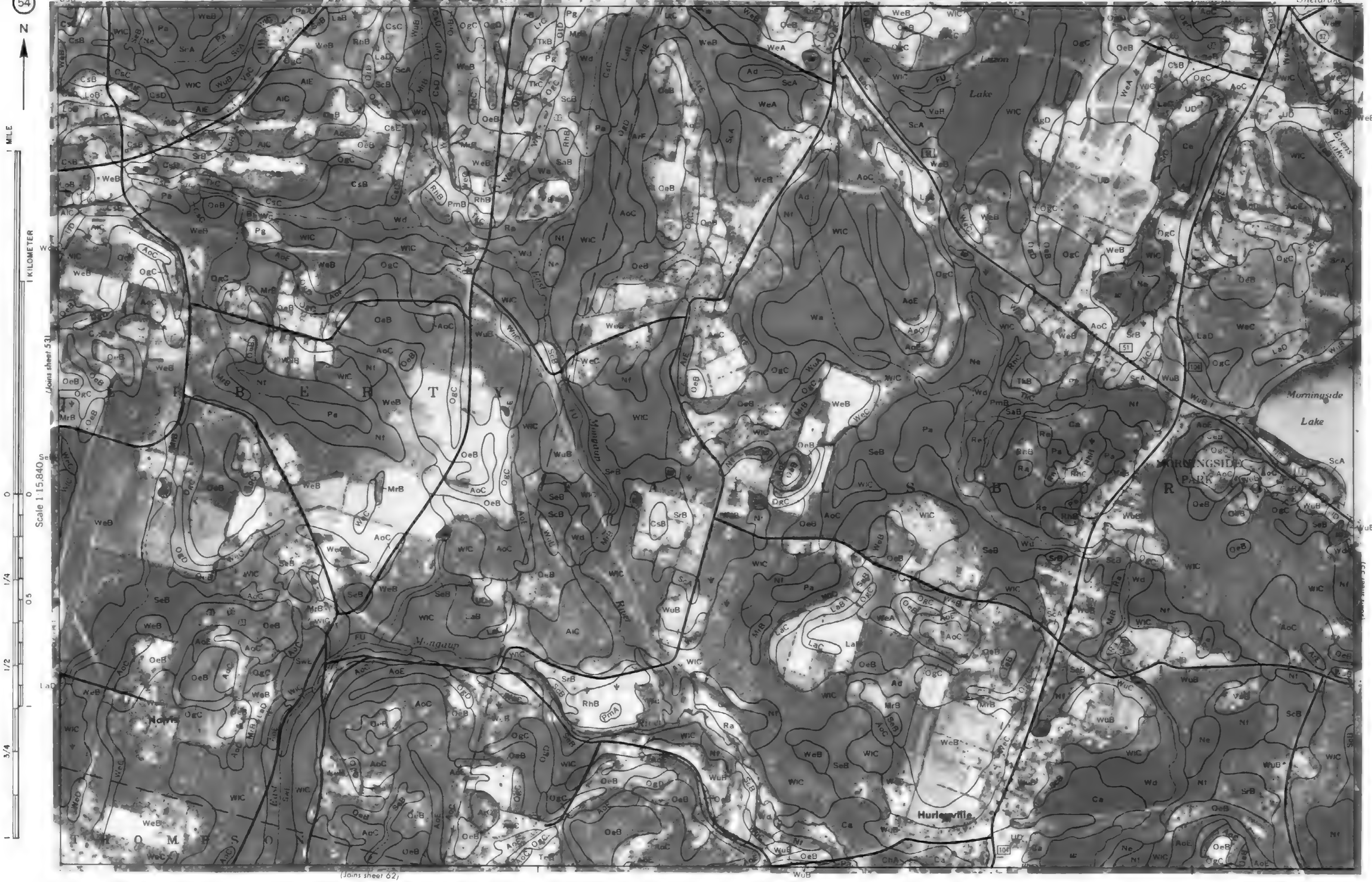
SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 50

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 51

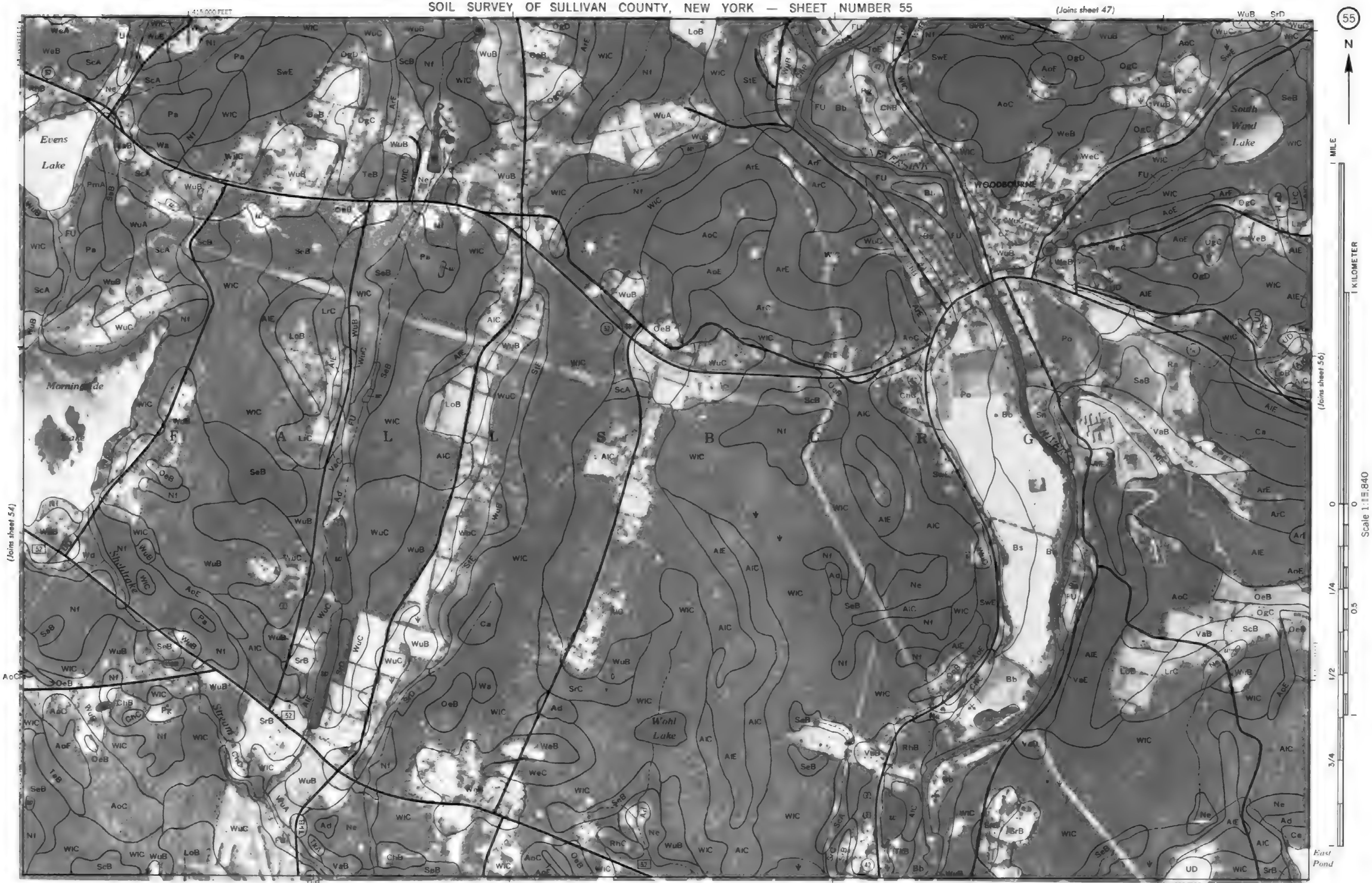

52
N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 51)
(Joins sheet 53)
(Joins sheet 60)
Swan Lake
Horseshoe Lake
LIBERTY
BETHEL

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 53

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 54

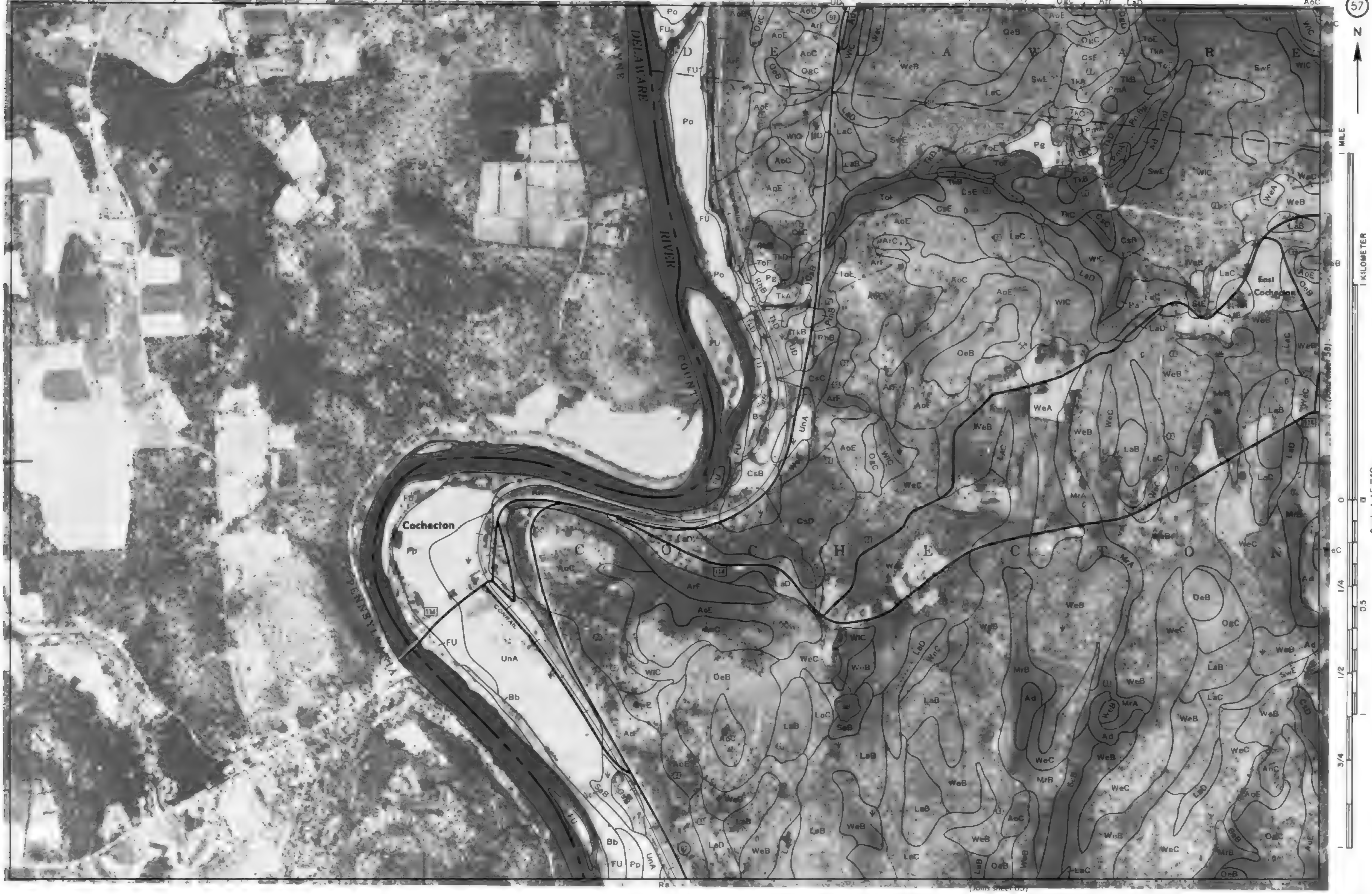


SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 55



SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 56

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 57




58
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 50)
(Joins sheet 57)
(Joins sheet 59)
(Joins sheet 66)
East Branch
Callicoon
Falls Mills
Kenoza Lake
Pine Lake
water
DELAWARE
COCHECTON
Fosterdale
Mitchell Pond
Mitchell Pond Brook
Bernhardt Pond
Kazens Pond
Nebraska
17
52
114
116
113
Ph
UD
Ce

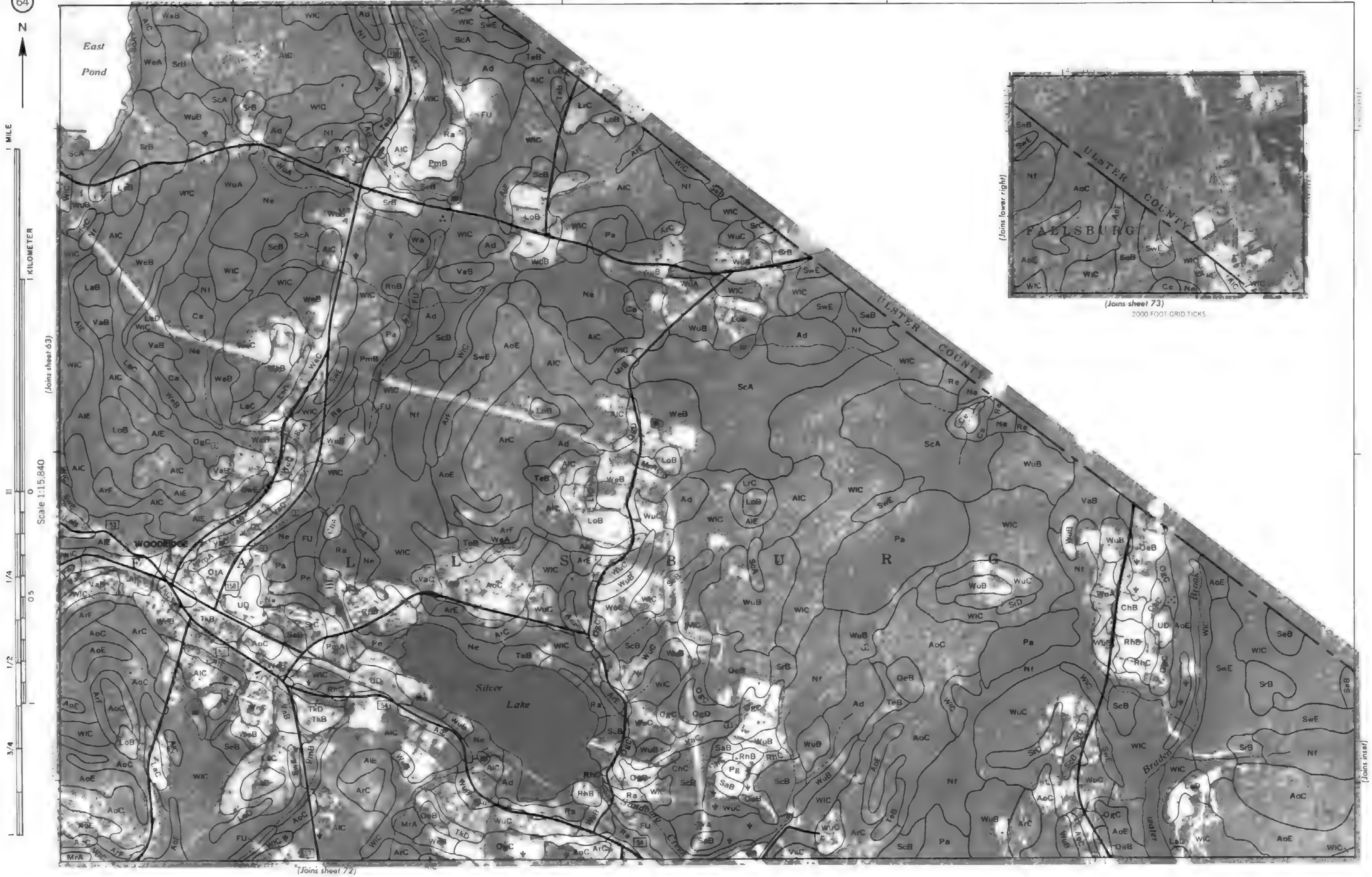

(Joins sheet 51)
59
N
(Joins sheet 58)
(Joins sheet 60)
(Joins sheet 67)
Hust Pond
Hunter Lake
Filippini Pond
Hurd Settlement
Jaketown
Birch Ridge
Hurd Brook
Lunchs Pond
Creek
water
D E L A W A R E
B E T H E L
C O C H E C T O N
1 MILE
1 KILOMETER
Scale 1:15,840
0
1/4
1/2
3/4
0.5


60
N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 52)
(Joins sheet 59)
(Joins sheet 61)
(Joins sheet 68)
370 000 FEET
Silver Lake
B E T H E L
SULLIVAN COUNTY INTERNATIONAL AIRPORT
UD

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 61


62
N
(Joins sheet 54)
(Joins sheet 61)
(Joins sheet 63)
(Joins sheet 70)
1 MILE
1 KILOMETER
Scale 1:15 840
T H O M P S O N
L U R G
Anawana Lake
water
Sheldrake Lake
Mongaup
Sprig
103
107


(Joins sheet 55)
63
N
Alta
Lake
water
Sheldrake
Stream
Fallsburg
SOUTH FALLSBURG
WOODRIDGE
Pleasure
Lake
NEVERSINK
RIVER
East
Pond
F A L L S B U R G
T H O M P S O N
(Joins sheet 62)
(Joins sheet 64)
(Joins sheet 71)
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5


(Joins sheet 56)
N
East
Pond
1 MILE
1 KILOMETER
(Joins sheet 63)
Scale 1:15 840
WOODRIDGE
F A L L S B U R G
Silver
Lake
ULSTER COUNTY
(Joins lower right)
(Joins sheet 73)
2000 FOOT GRID TICKS
(Joins inset)
(Joins sheet 72)

(Joins sheet 57)

65

(Joins sheet 66)

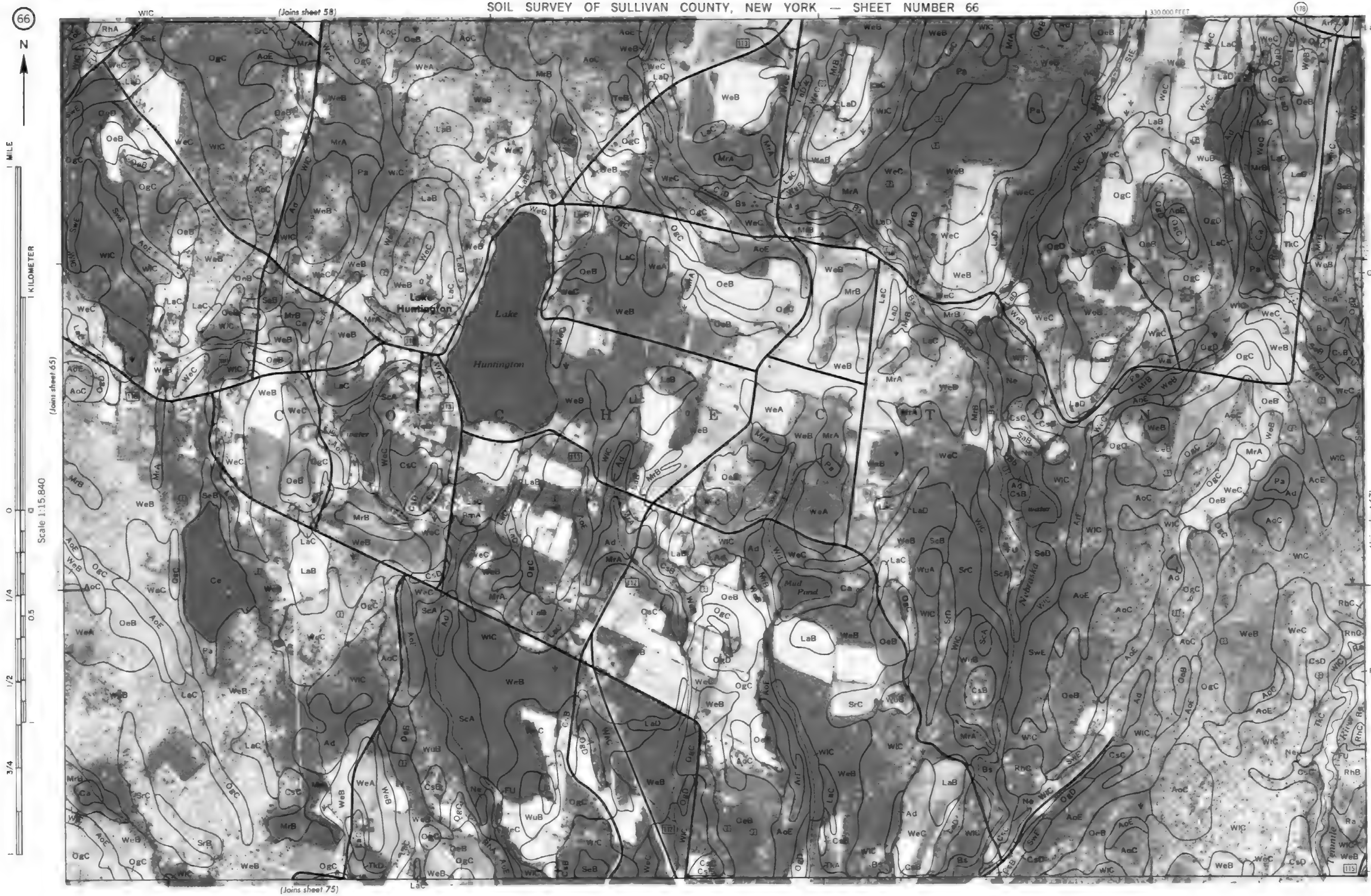
N

1 MILE

1 KILOMETER

Scale 1:15 840

(Joins sheet 74)

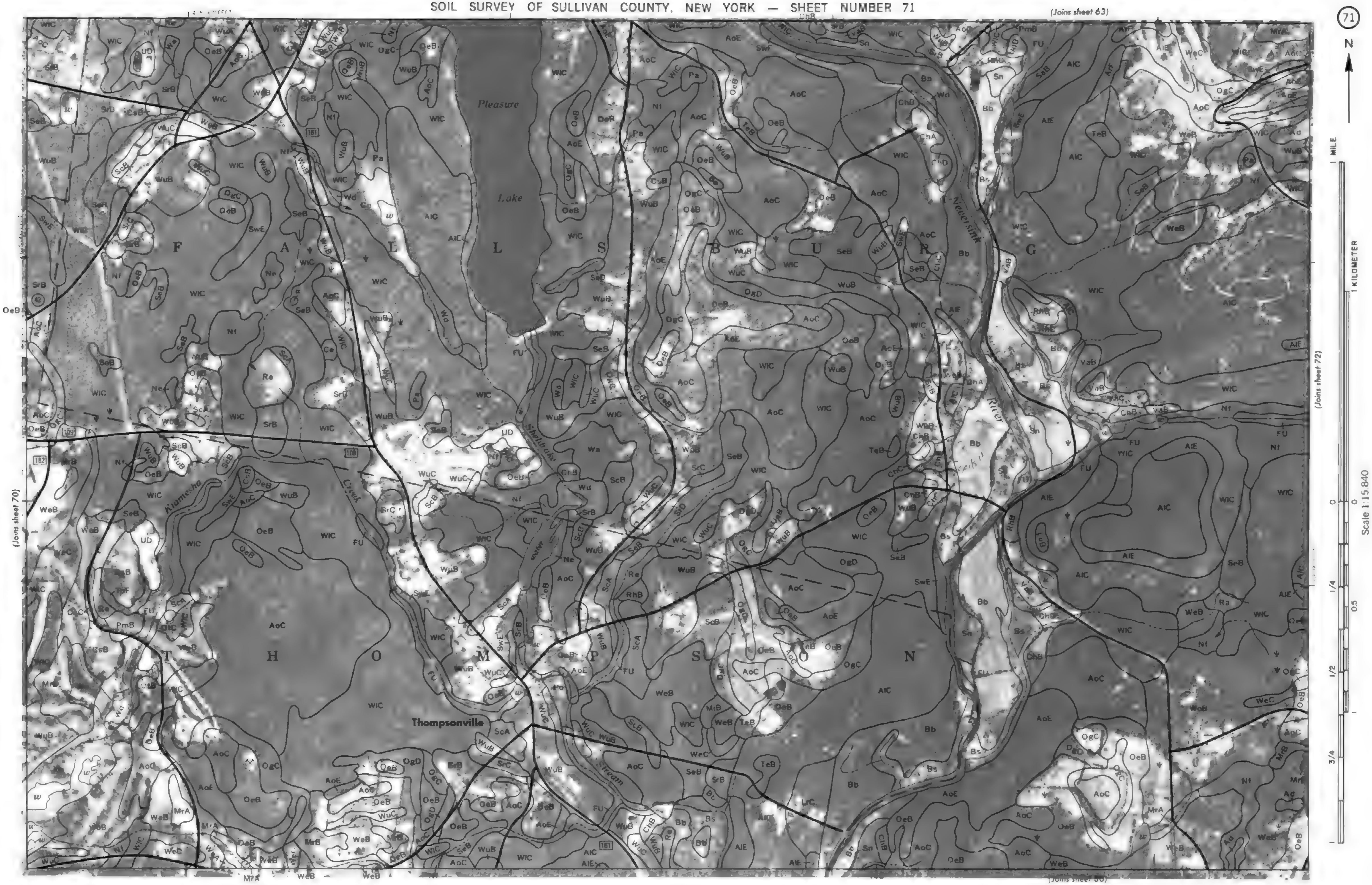

66
N
(Joins sheet 58)
330 000 FEET
(Joins sheet 65)
(Joins sheet 67)
(Joins sheet 75)
Lake Huntington
Lake
Huntington
Mud Pond
water
Brook
Nebraska
C O C H E C T O N
1 MILE
1 KILOMETER
Scale 1:15,840
0
1/4
0.5
1/2
3/4
1

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 67


68
N
(Joins sheet 60)
(Joins sheet 67)
(Joins sheet 69)
(Joins sheet 77)
Scale 1:15 840
1 MILE
1 KILOMETER
Amber Lake
White Lake
Kauneonga Lake
White Lake
Smallwood
Mountain Lake
Black Lake
Briscoe Pond
BETHEL

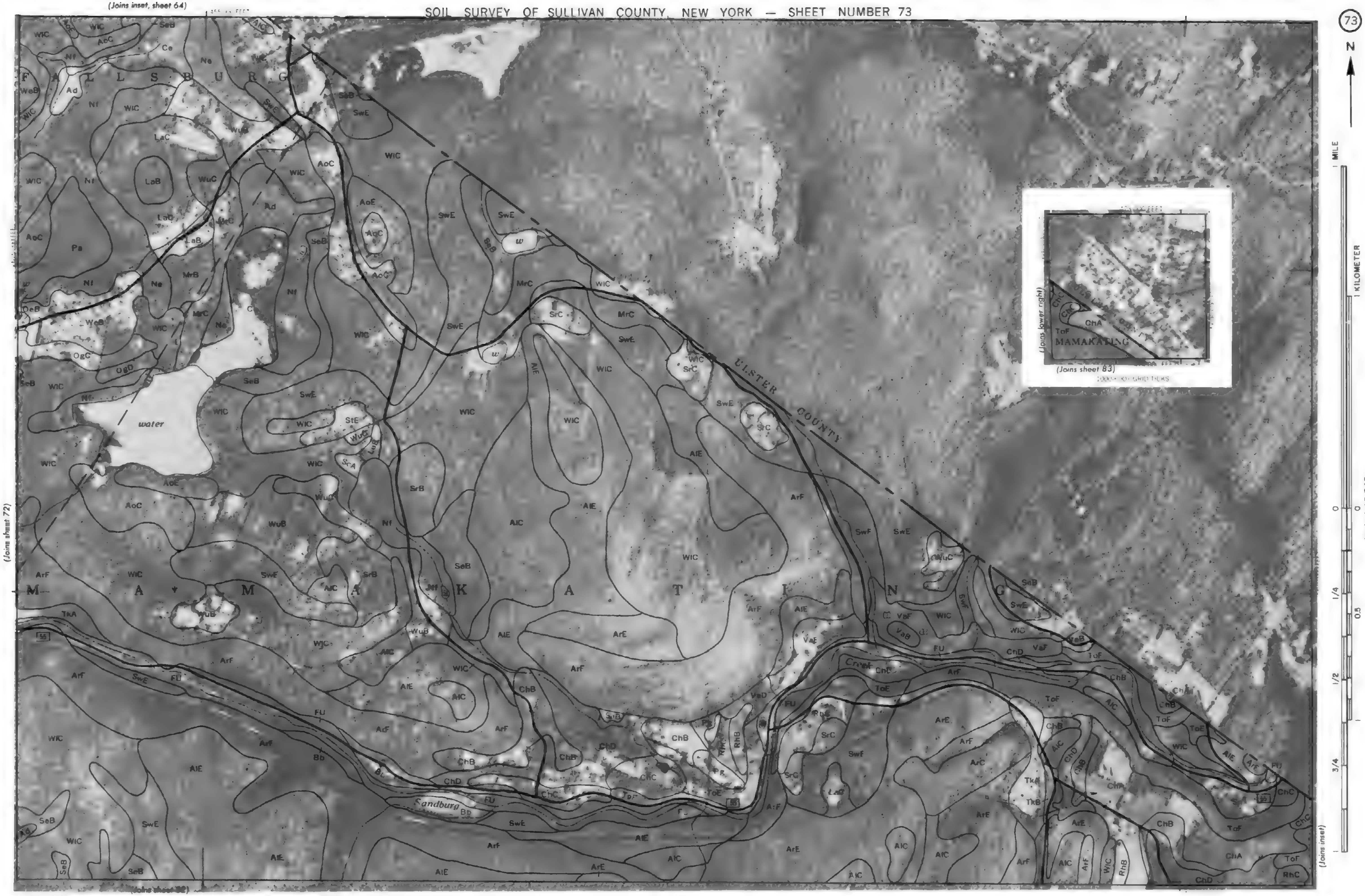

69
(Joins sheet 61)
SULLIVAN COUNTY INTERNATIONAL AIRPORT
Zieger Pond
BETHEL
THOMPSON
Mongaup Valley
Dodge Pond
Maplewood
ROUTE 17
EXPRESSWAY
(Joins sheet 68)
(Joins sheet 70)
(Joins sheet 78)
N
1 MILE
1 KILOMETER
Scale 1:15,840


70
N
(Joins sheet 62)
(Joins sheet 69)
(Joins sheet 71)
(Joins sheet 79)
MILE
KILOMETER
Scale 1:15 840
Baileys
Lake
Kiamesha
Lake
T H O M P S O N
MONTICELLO
(County Seat)
water

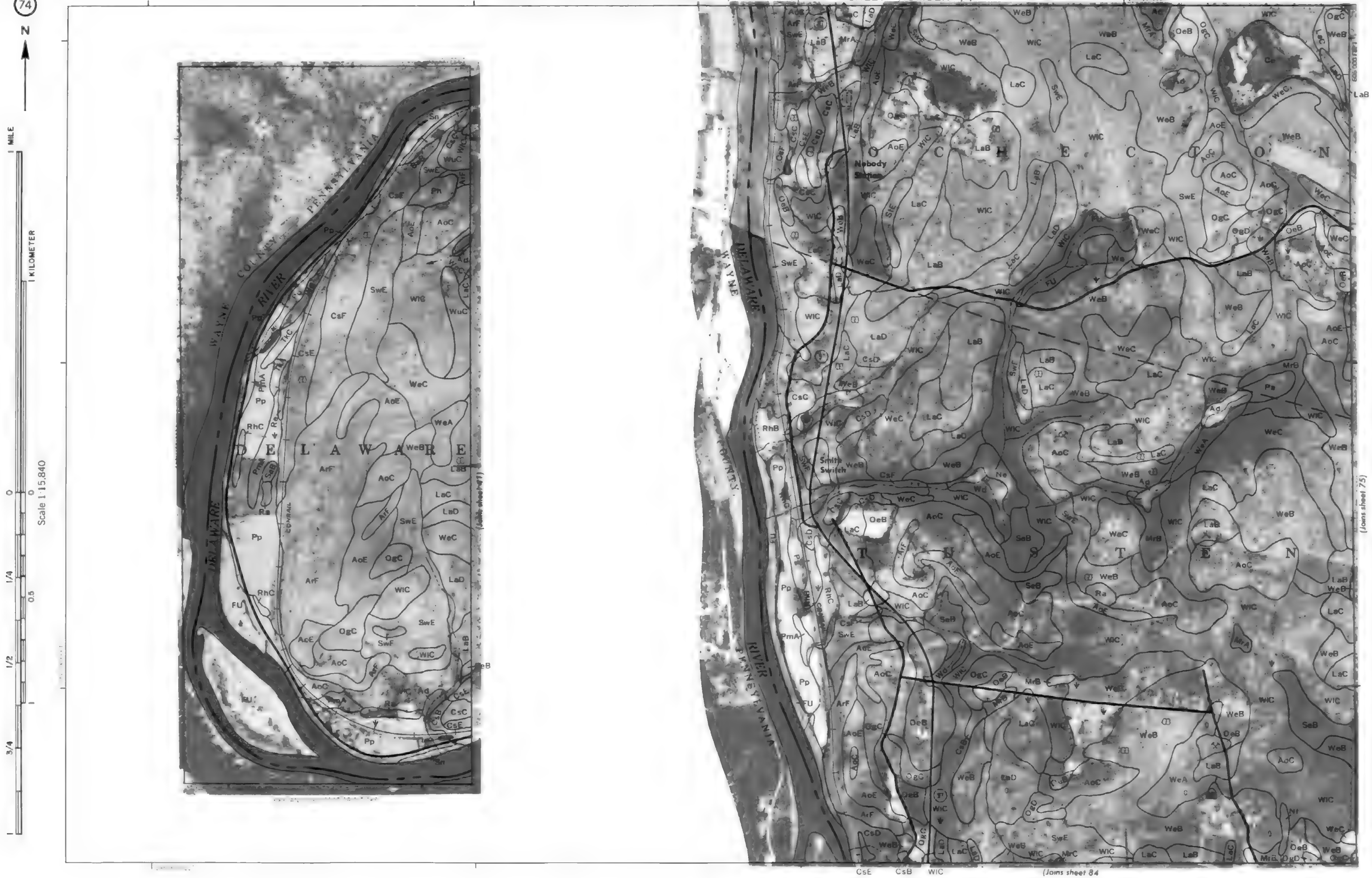

71
N
(Joins sheet 63)
(Joins sheet 72)
(Joins sheet 70)
(Joins sheet 80)
Pleasure Lake
Neversink River
Kiamesha Creek
Sheldrake Stream
FALLSBURG
THOMPSON
Thompsonville
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0.5


(Joins sheet 64)
(Joins sheet 71)
(Joins sheet 73)
(Joins sheet 81)
N
1 MILE
1 KILOMETER
Scale 1:15 840
F A L L S B U R G
MOUNTAINDALE
Katz Pond
MAMAKATING
Sandburg
Creek
Brook
Hudson

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 73



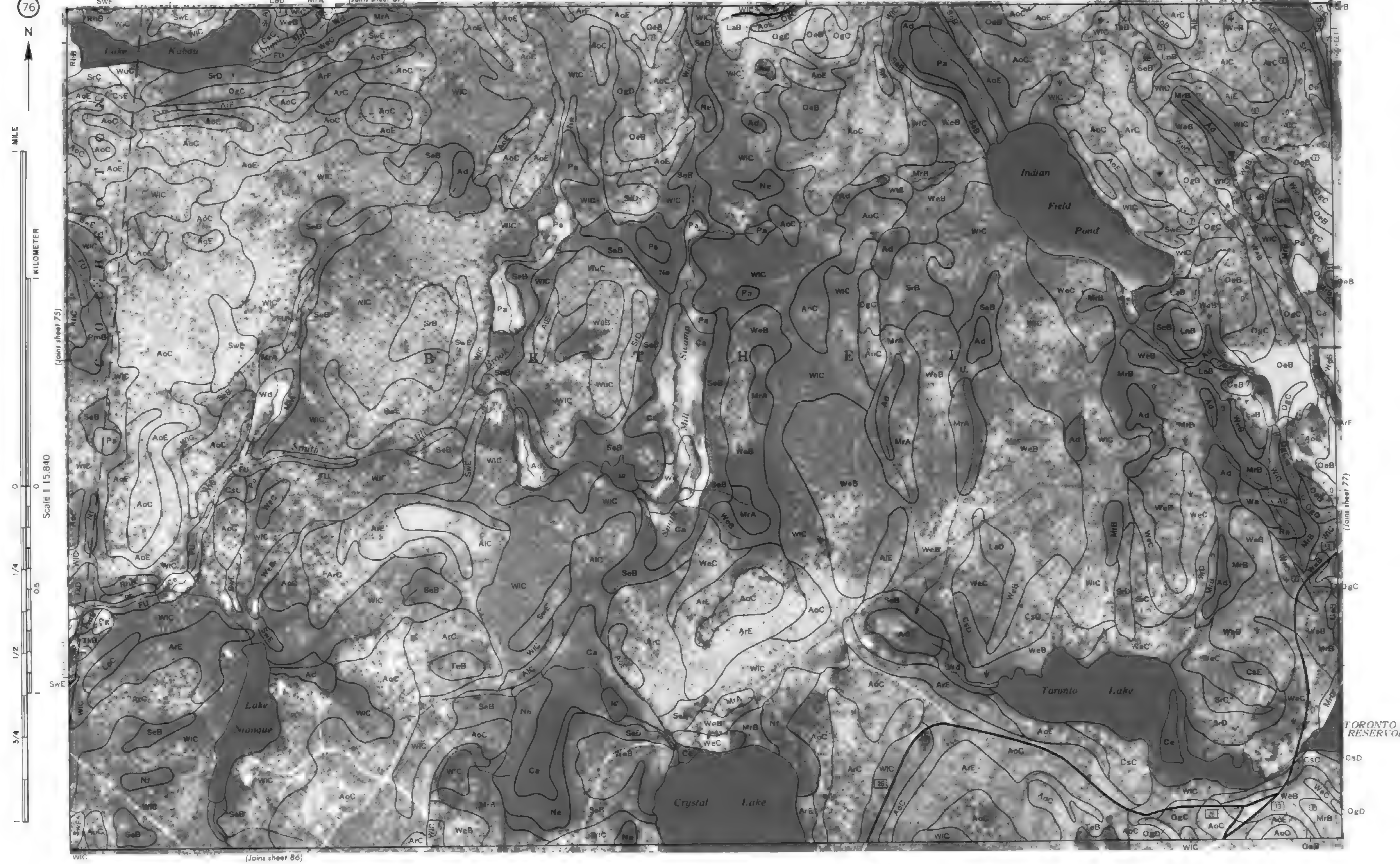
SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 74

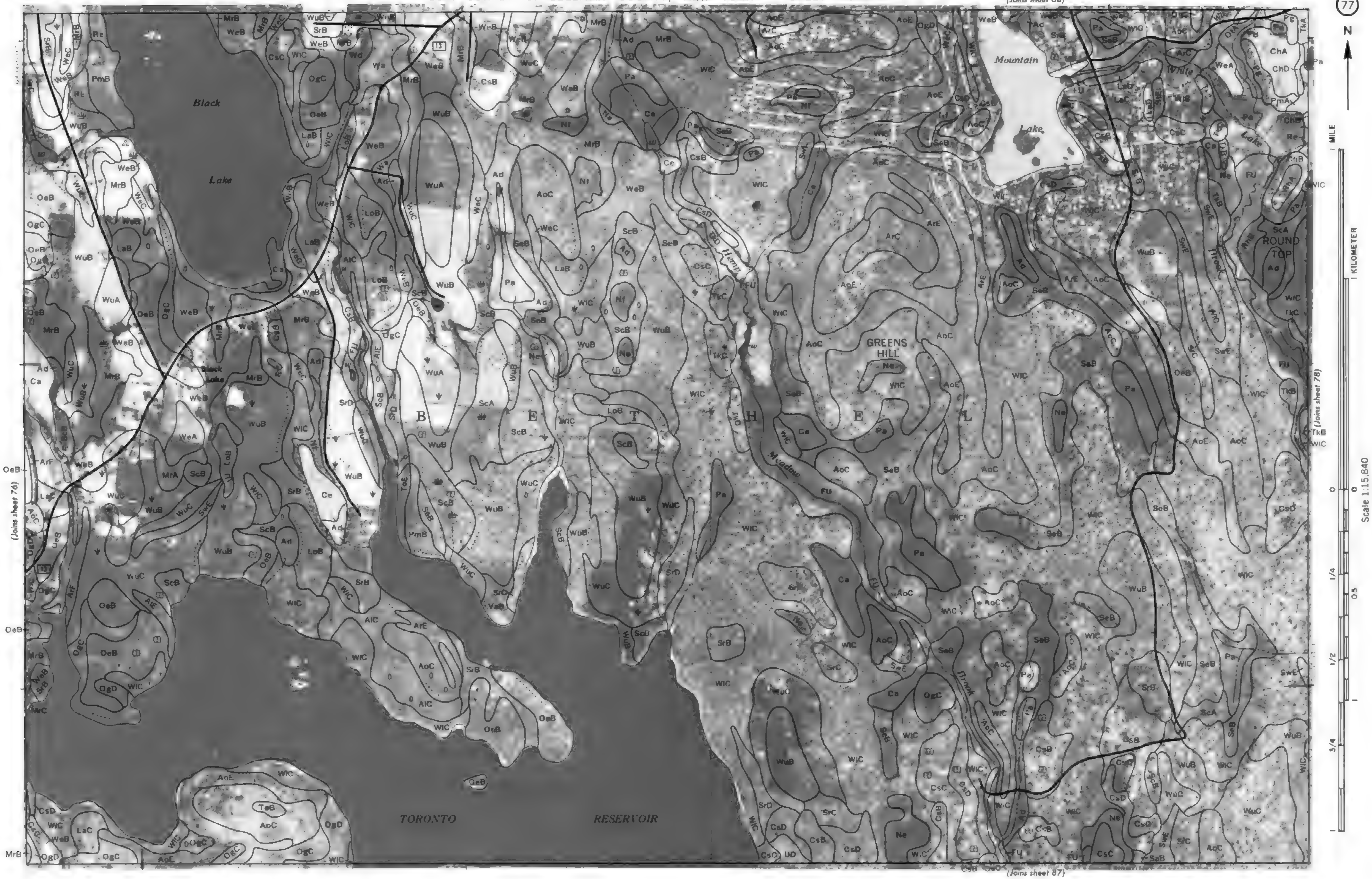


75


(Joins sheet 66)
(Joins sheet 76)
(Joins sheet 74)
(Joins sheet 85)
Cochecton Center
Perry Pond
Tylertown
Tennile River
C O C H E C T O N
T U S T E N
water
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5

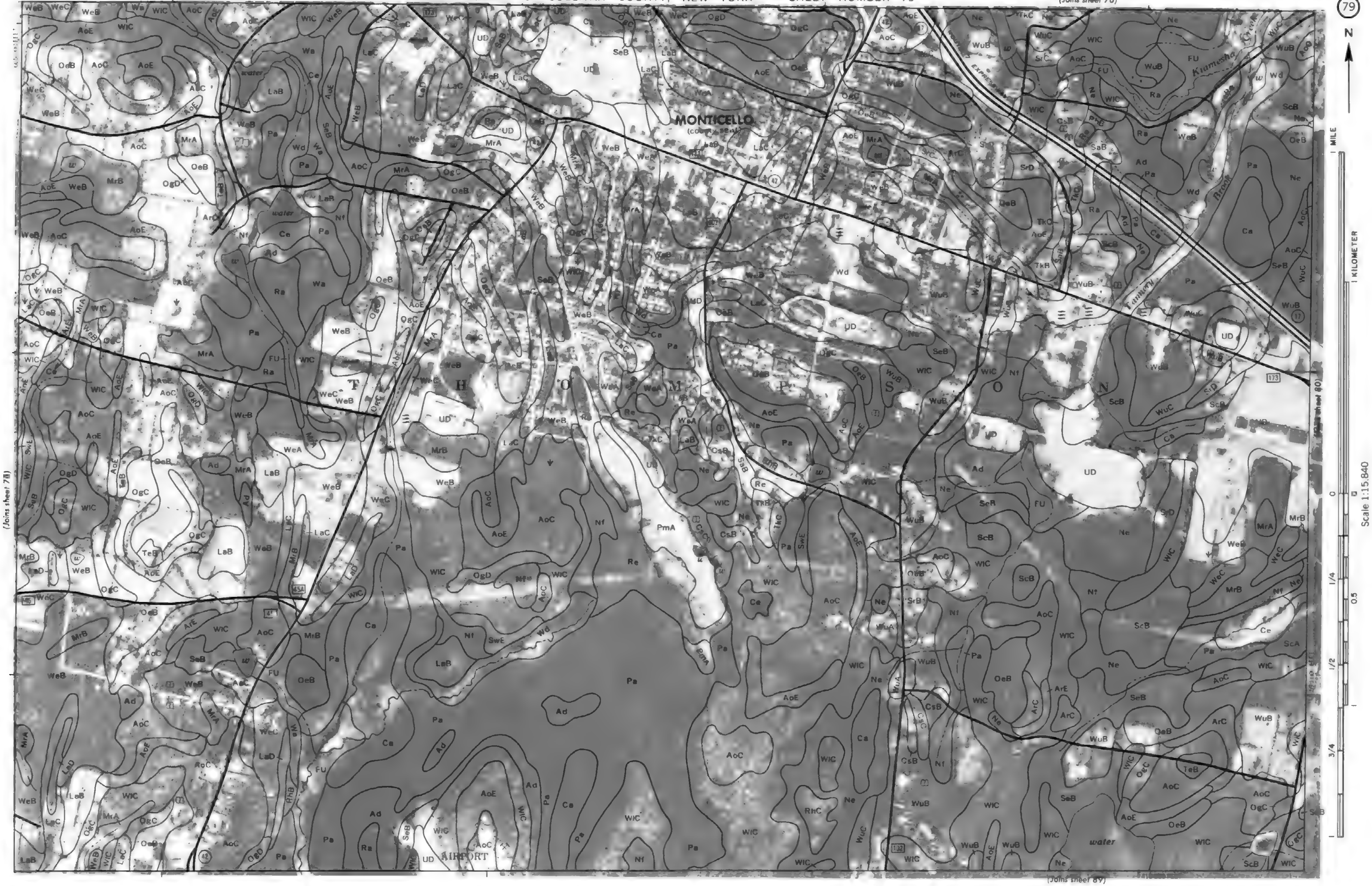
SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 76



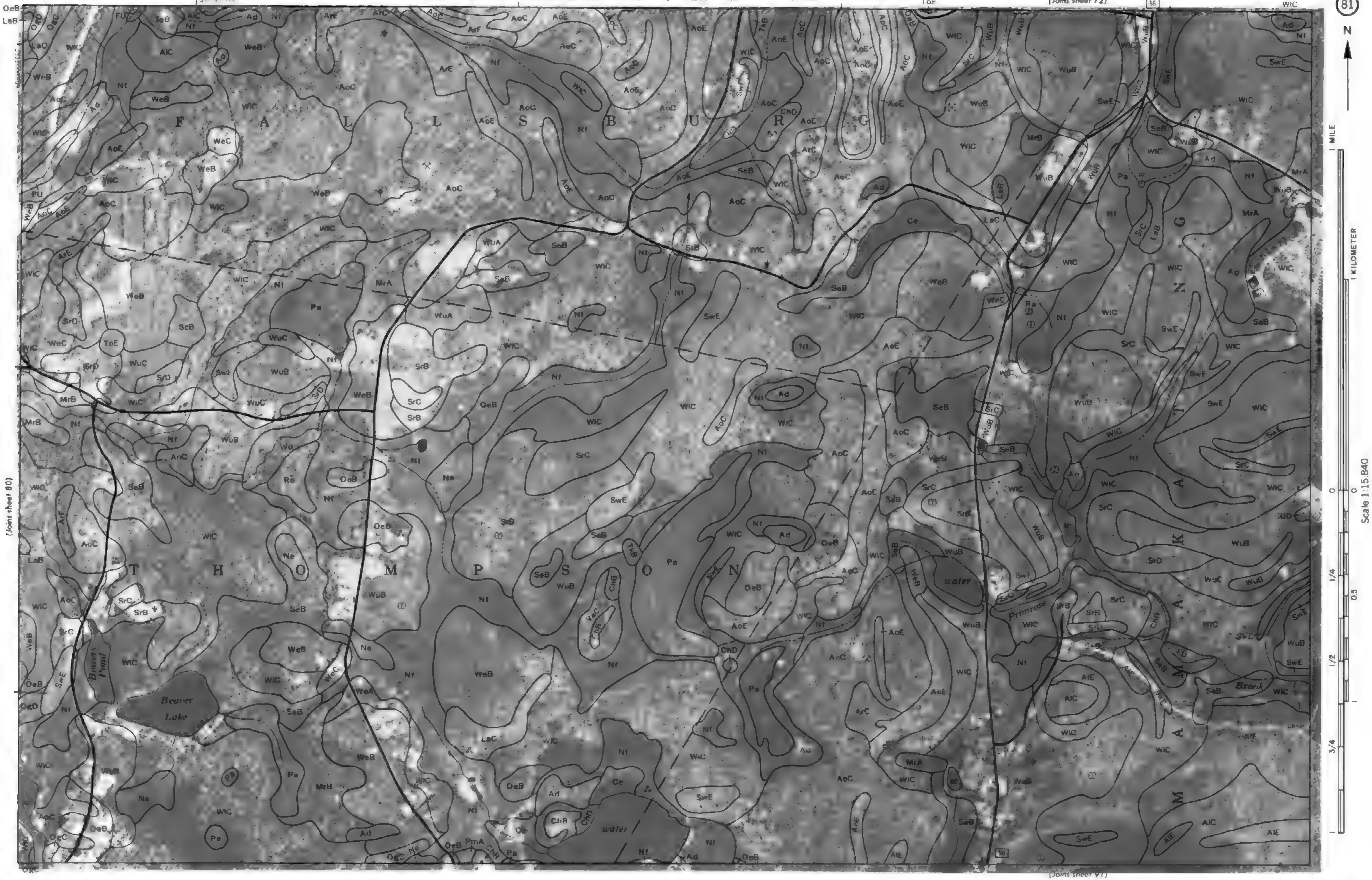

(Joins sheet 68)
77
N
Black
Lake
Black Lake
Mountain
Lake
White
Lake
ROUND TOP
GREENS HILL
B E T H E L
Hemp
Meadow
Brook
TORONTO
RESERVOIR
(Joins sheet 76)
(Joins sheet 78)
(Joins sheet 87)
1 MILE
1 KILOMETER
Scale 1:15,840

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 78

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 79

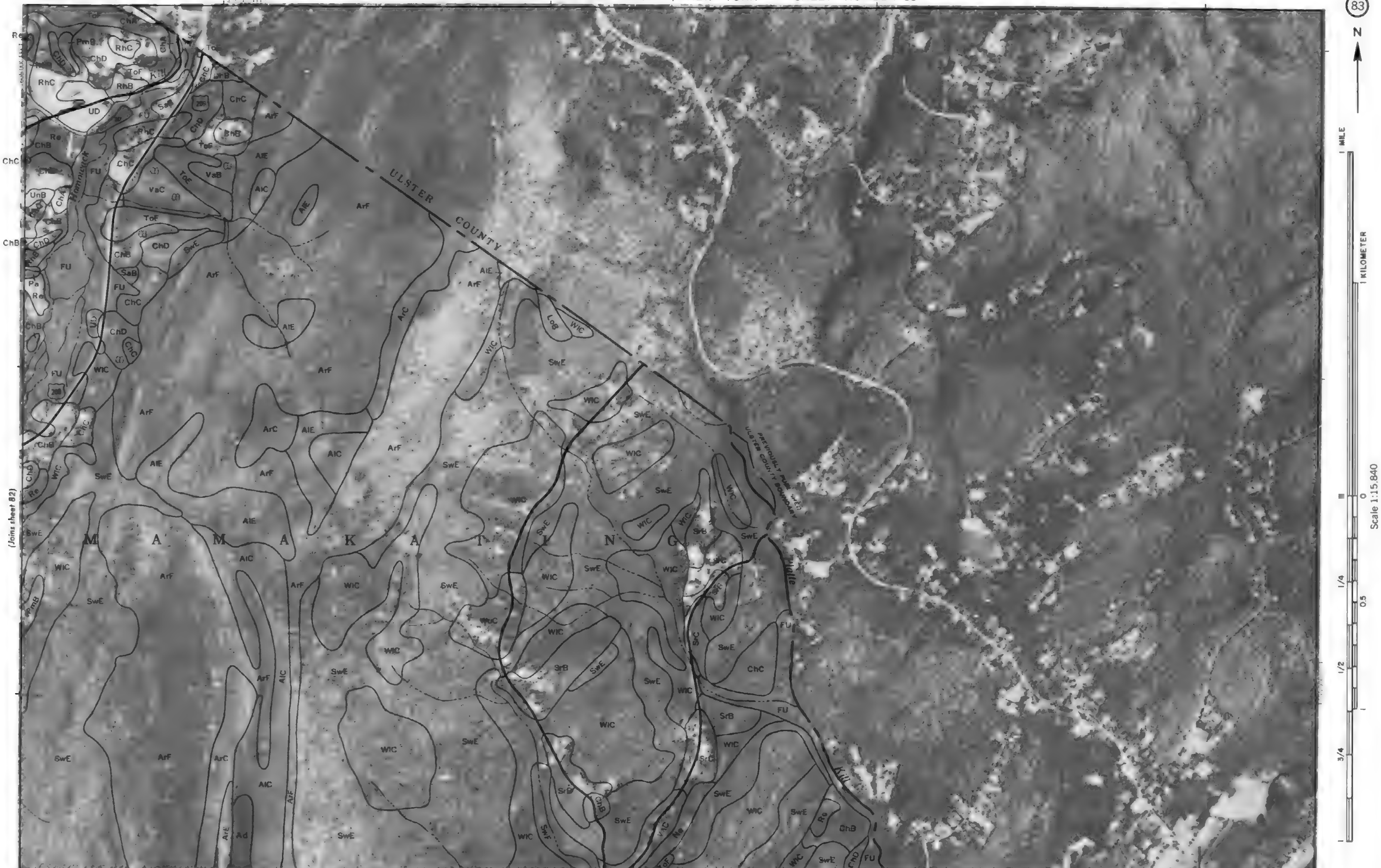



(Joins sheet 71)
(Joins sheet 79)
(Joins sheet 90)
N
1 MILE
1 KILOMETER
Scale 1:15 840
T H O M P S O N
F A L L S B U R G
Glen Wild
Rock Hill
Bridgeville
Sheldrake Stream
Fowlwood Brook
NEVERSINK RIVER
EXPRESSWAY
water

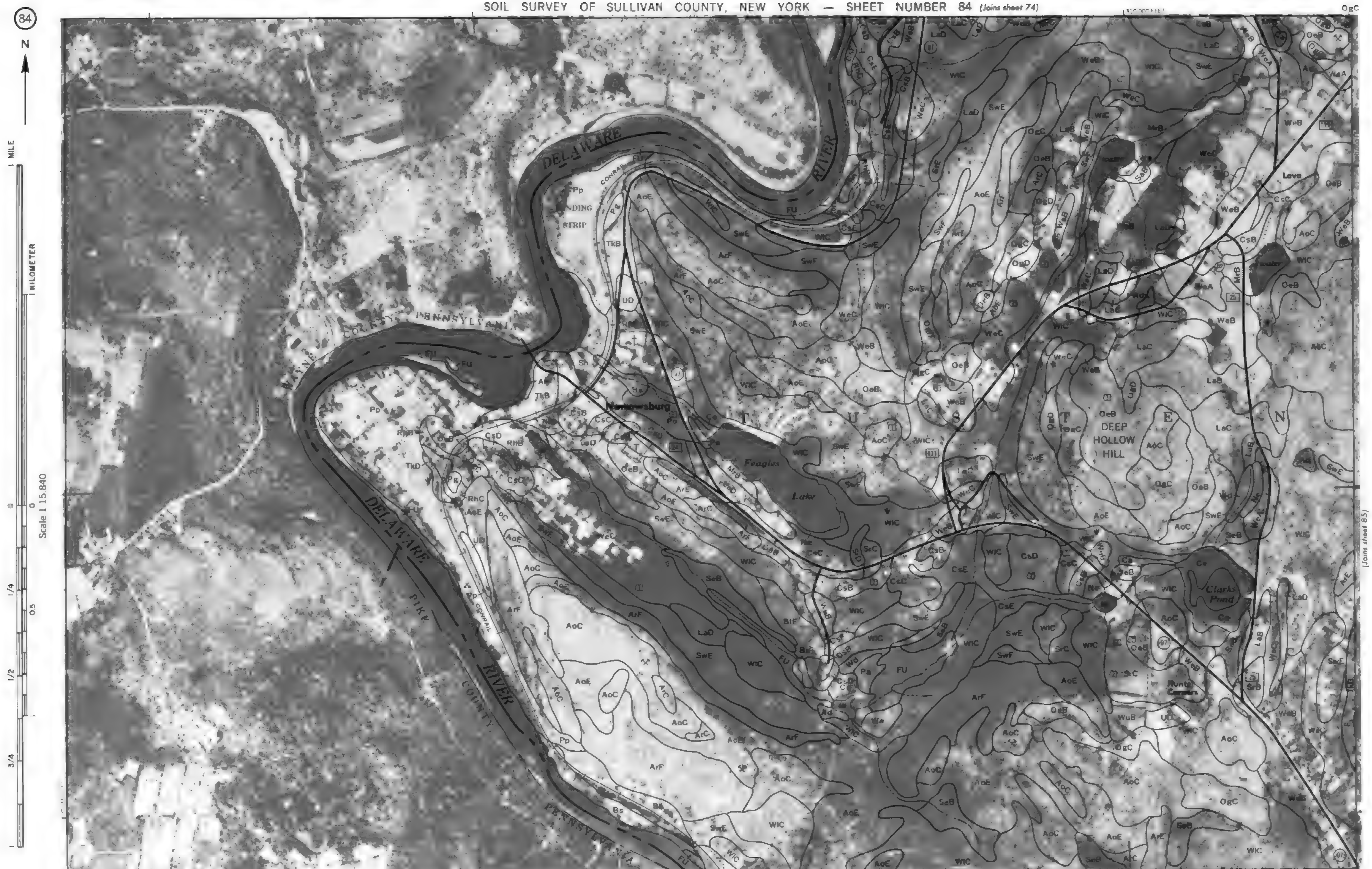

81
(Joins sheet 72)
(Joins sheet 80)
(Joins sheet 91)
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0.5
F A L L S B U R G
T H O M P S O N
M A M A K A T I N G
Beaver Lake
Beavers Pond
water
Primrose Brook
56

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 82

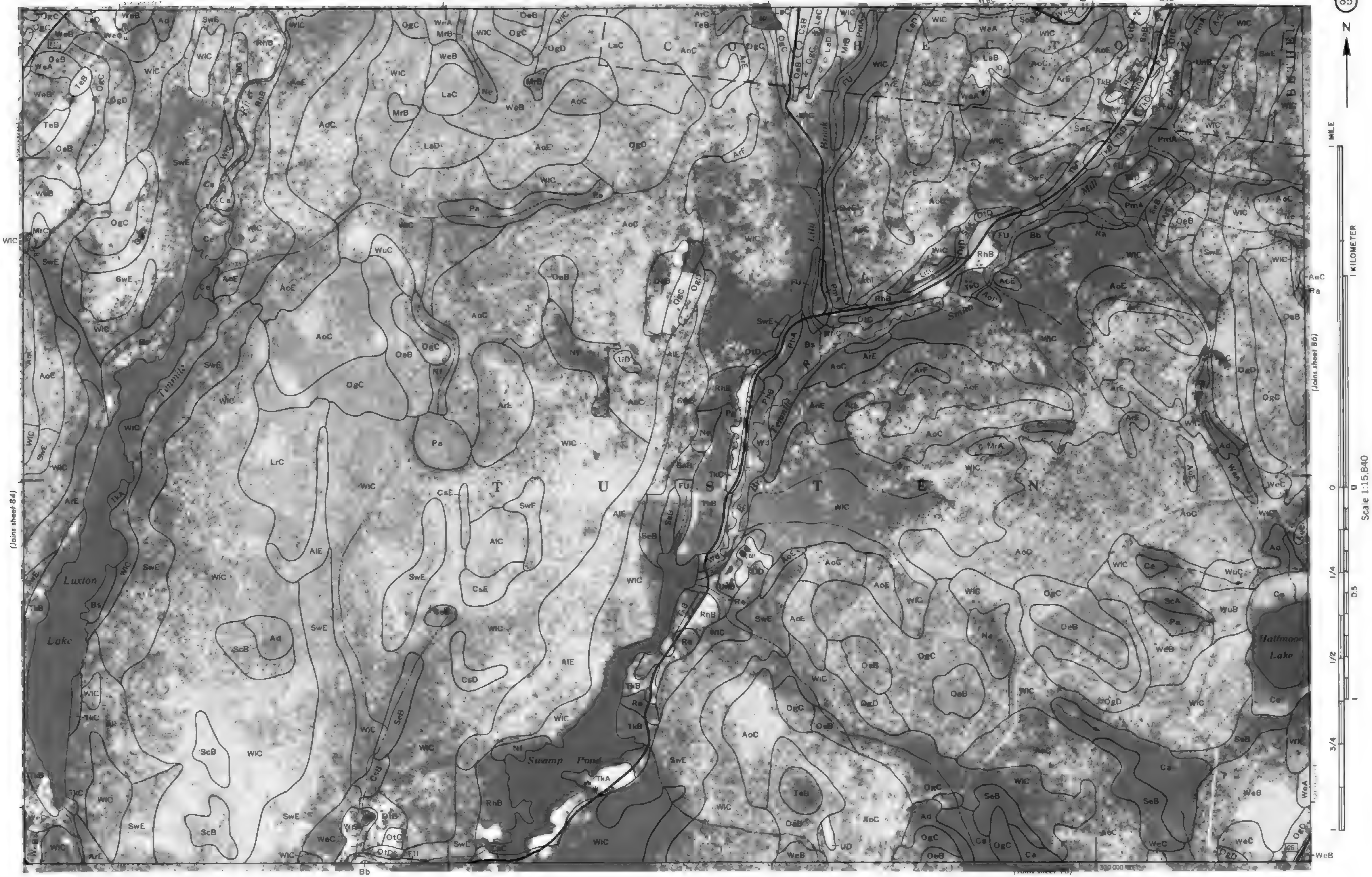
(Joins inset, sheet 73)



(Joins sheet 93)



(Joins sheet 94)


85
N
(Joins sheet 75)
(Joins sheet 84)
(Joins sheet 86)
(Joins sheet 95)
C O C H E C T O N
T U S T E N
BETHEL
Luxton Lake
Swamp Pond
Halfmoon Lake
Tennanah
Little Brook
Mill Brook
Smith
MILE
KILOMETER
Scale 1:15,840
0
1/4
1/2
3/4
1
0.5
WlC
AoC
AoE
ArE
ArF
AlE
AlC
OgC
OgD
OeB
SwE
WeB
WeA
WeC
LaC
LaD
LaB
MrB
MrA
Pa
Ne
Nf
Ca
Ce
Ad
ScB
ScA
SeB
CsE
CsD
CsB
TeB
TkA
TkB
TkC
TkD
RhB
Re
Ra
Bb
Bs
FU
PmA
UD
OtC
OtD
LrC
WuC
WuB
UnB

(Joins sheet 76)

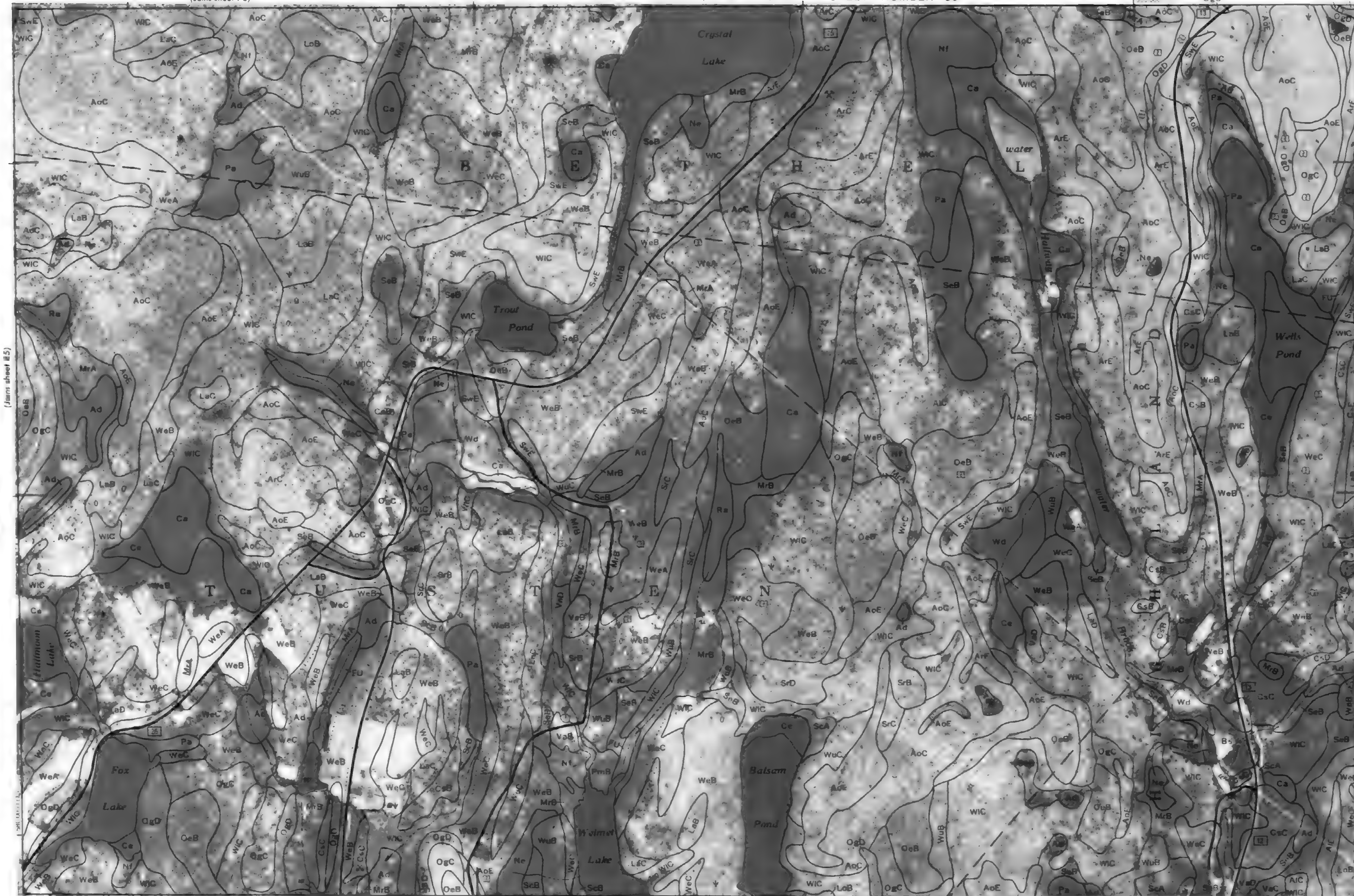
N

1 MILE

KILOMETER

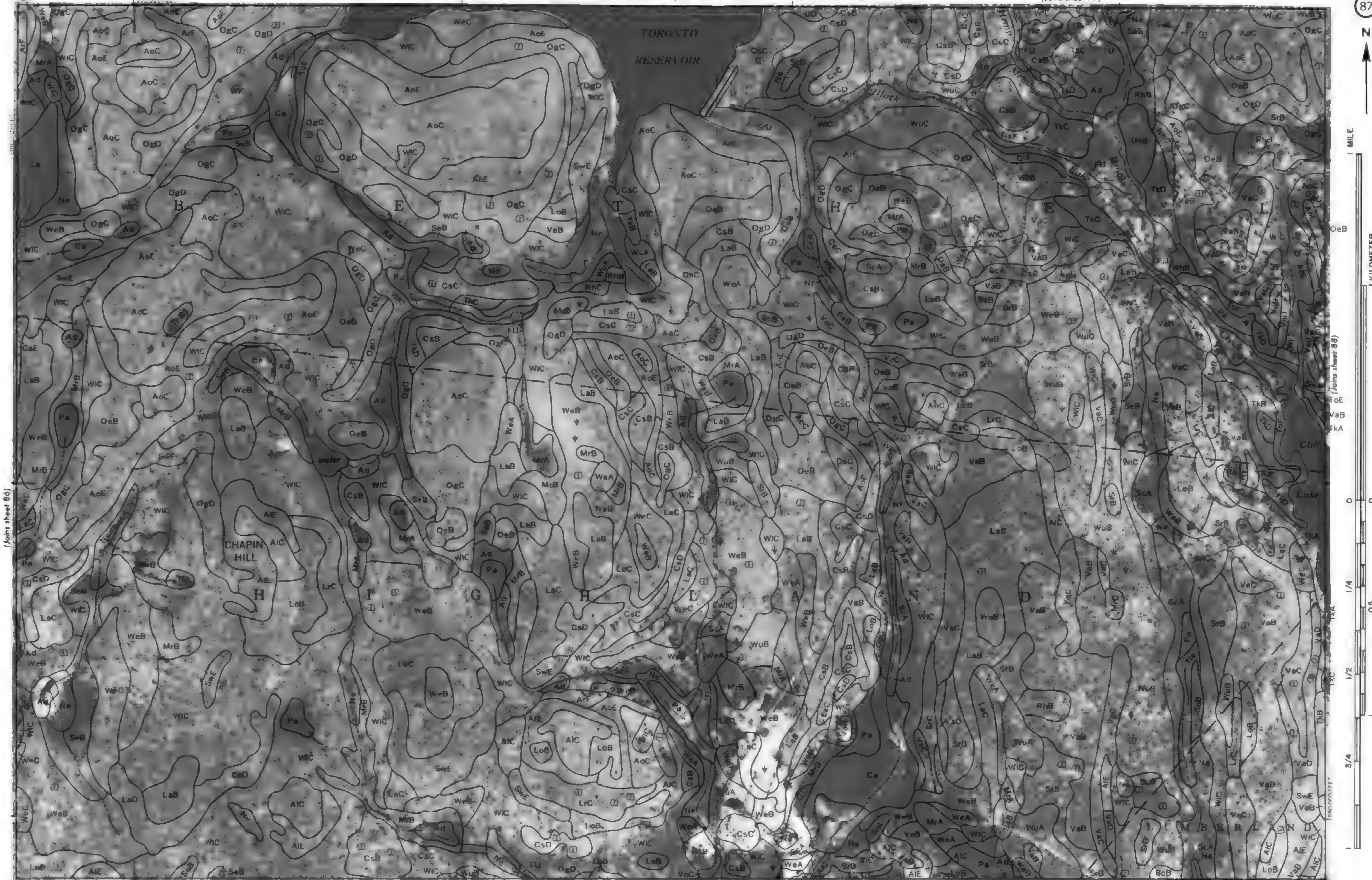
Scale 1:15,840

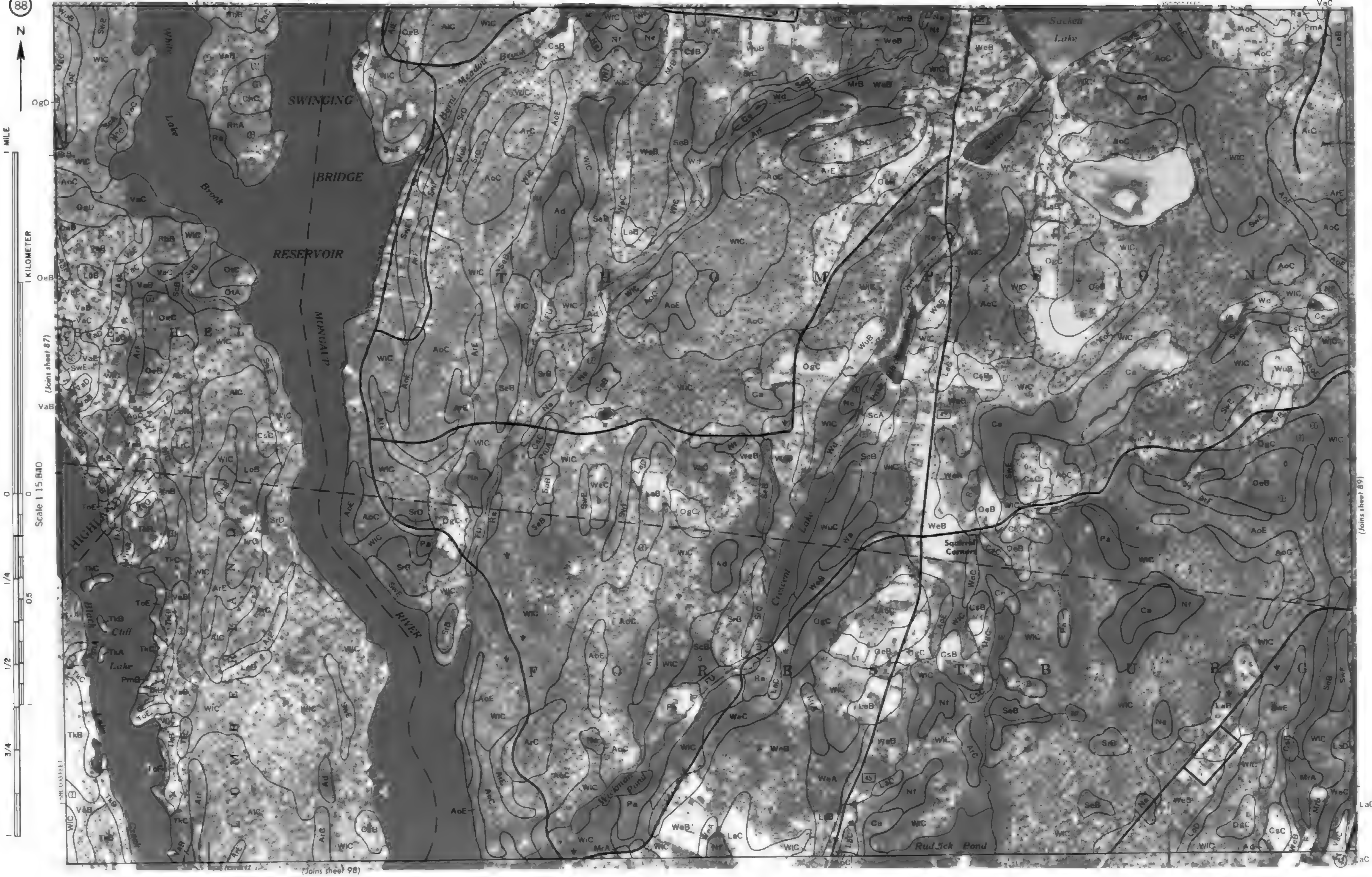
(Joins sheet 85)



(Joins sheet 87)

(Joins sheet 96)


87
(Joins sheet 77)
(Joins sheet 88)
(Joins sheet 86)
(Joins sheet 97)
TORONTO RESERVOIR
CHAPIN HILL
Black
Lake
Cliff
Lake
N
1 MILE
1 KILOMETER
Scale 1:15,840
0
1/4
1/2
3/4
1
0
0.5


(Joins sheet 78)
(Joins sheet 87)
(Joins sheet 89)
(Joins sheet 98)
N
1 MILE
1 KILOMETER
Scale 1:15 840
SWINGING
BRIDGE
RESERVOIR
MONGAUP
RIVER
White
Lake
Brook
Burnt
Meadow
Brook
Sackett
Lake
Crescent
Lake
Squirrel
Corners
Wildman
Pond
Rudnick Pond
Black
Cliff
Lake
HIGHLAND
T H O M P S O N
F O R E S T B U R G
L U M B E R
(Joins sheet 78)

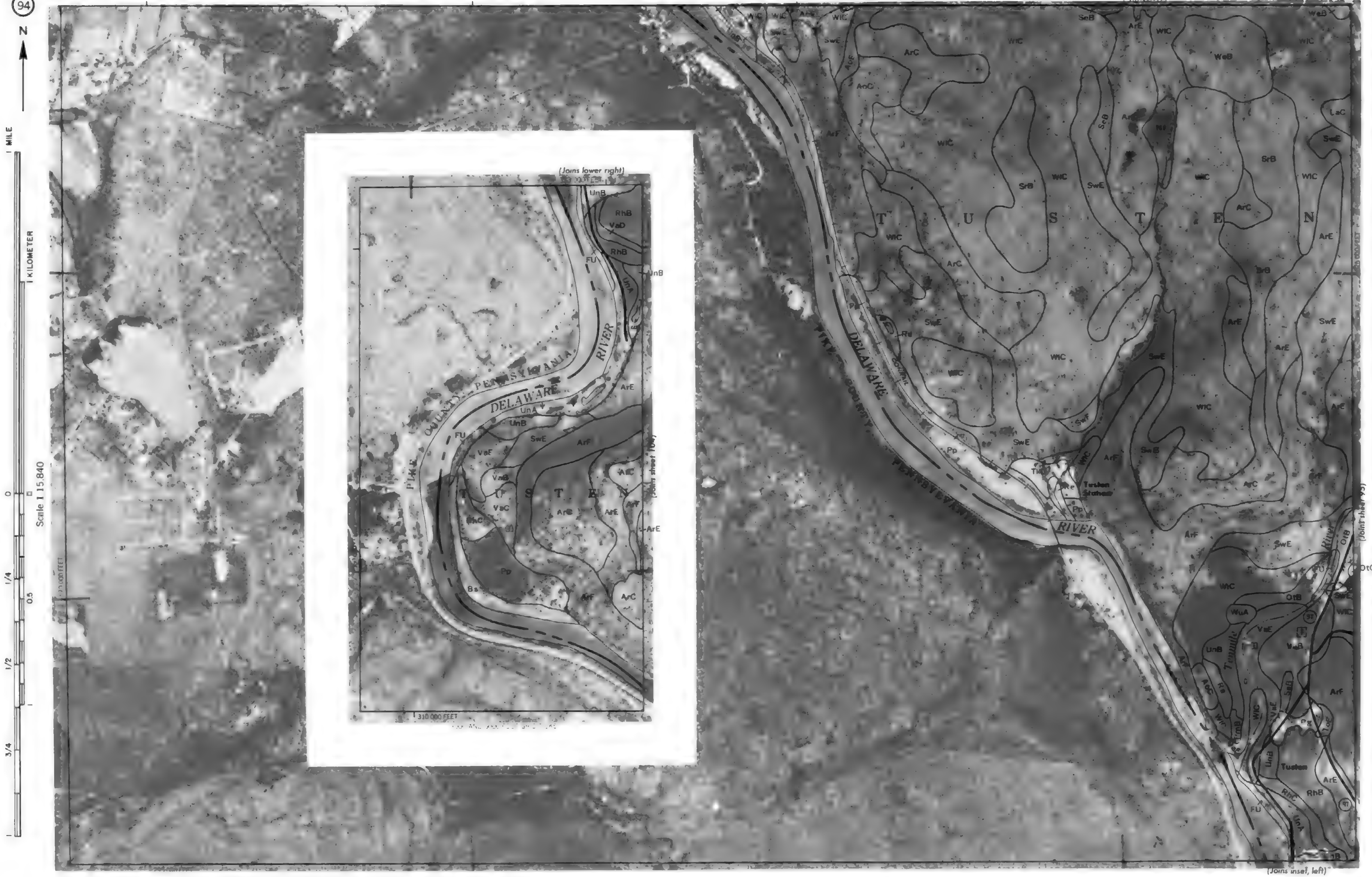

89
(Joins sheet 79)
(Joins sheet 88)
(Joins sheet 90)
(Joins sheet 99)
N
1 MILE
1 KILOMETER
Scale 1:15 840
Wildwood Lake
Saint Josephs Lake
Melody Lake
AIRPORT
water
THOMPSON
FORESTBURGH


(Joins sheet 80)
(Joins sheet 89)
(Joins sheet 91)
(Joins sheet 100)
N
1 MILE
1 KILOMETER
Scale 1:15,840
THOMPSON
NEVERSINK RIVER
Lake Louise Marie
Treasure Lake
Wolf Lake
Katrina Falls
FORESTBURGH
water

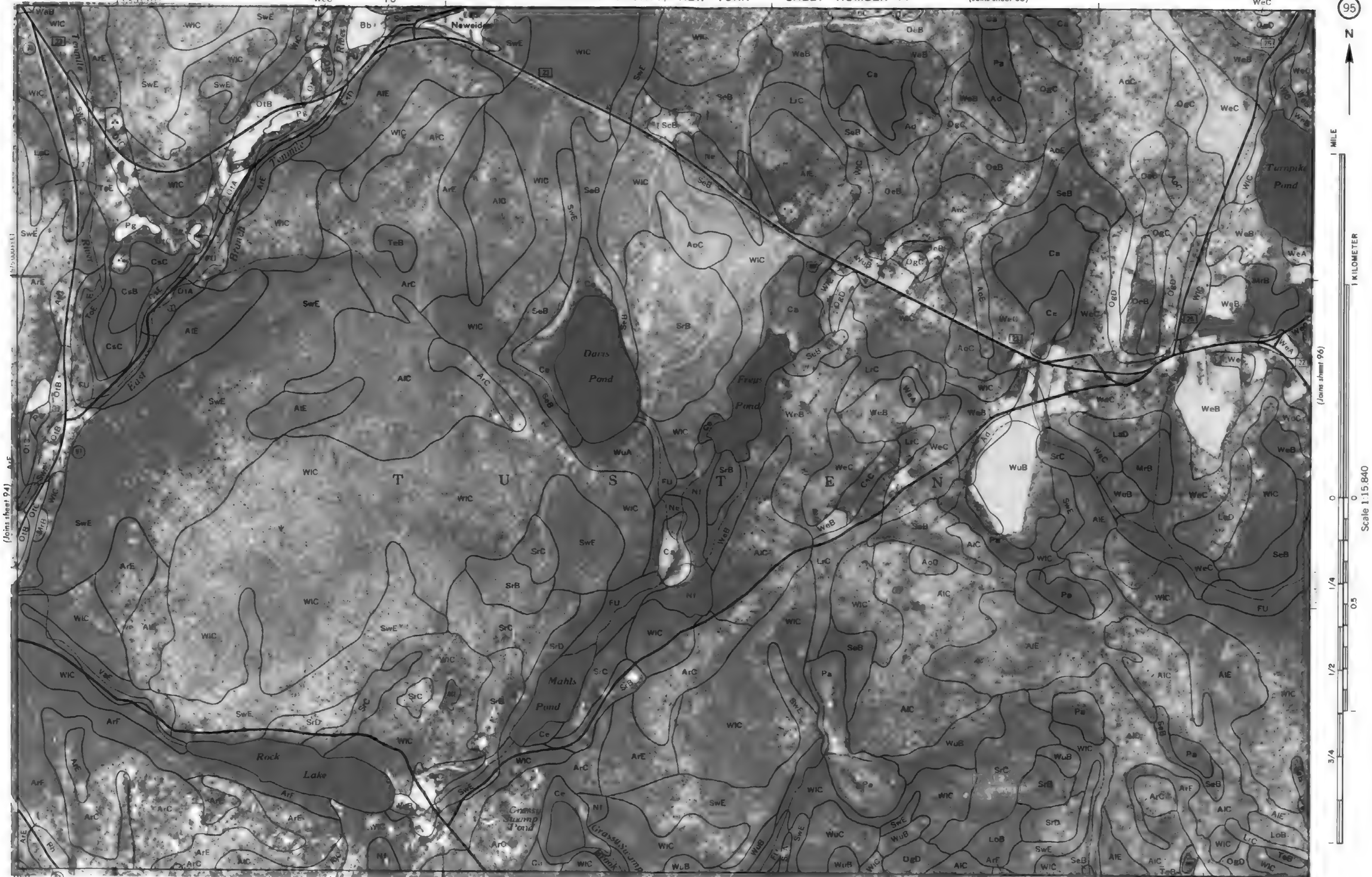

(Joins sheet 81)
91
N
(Joins sheet 92)
(Joins sheet 90)
(Joins sheet 101)
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
Wanaksink
Lake
Gold
Point
Middletown
Point
Lake
Louise Marie
Lake
Louise
Marie
Momoketing
Park
Mastens
Lake
Yankee
Lake
Mount
Prosper
South
Brook
Willsey
Brook
ROUTE 17
EXPRESSWAY
M A M A K A T I N G
N O S P M O H T


(Joins sheet 82)
(Joins sheet 91)
(Joins sheet 93)
(Joins sheet 102)
N
1 MILE
1 KILOMETER
Scale 1:15 840
Summitville
WURTSBORO
Wurtsboro Hills
M A M A K A T I N G
HILLS
WURTSBORO SULLIVAN COUNTY AIRPORT
South Brook
Gumaer Brook
Pitmans Brook
BASHER Kill
Brook

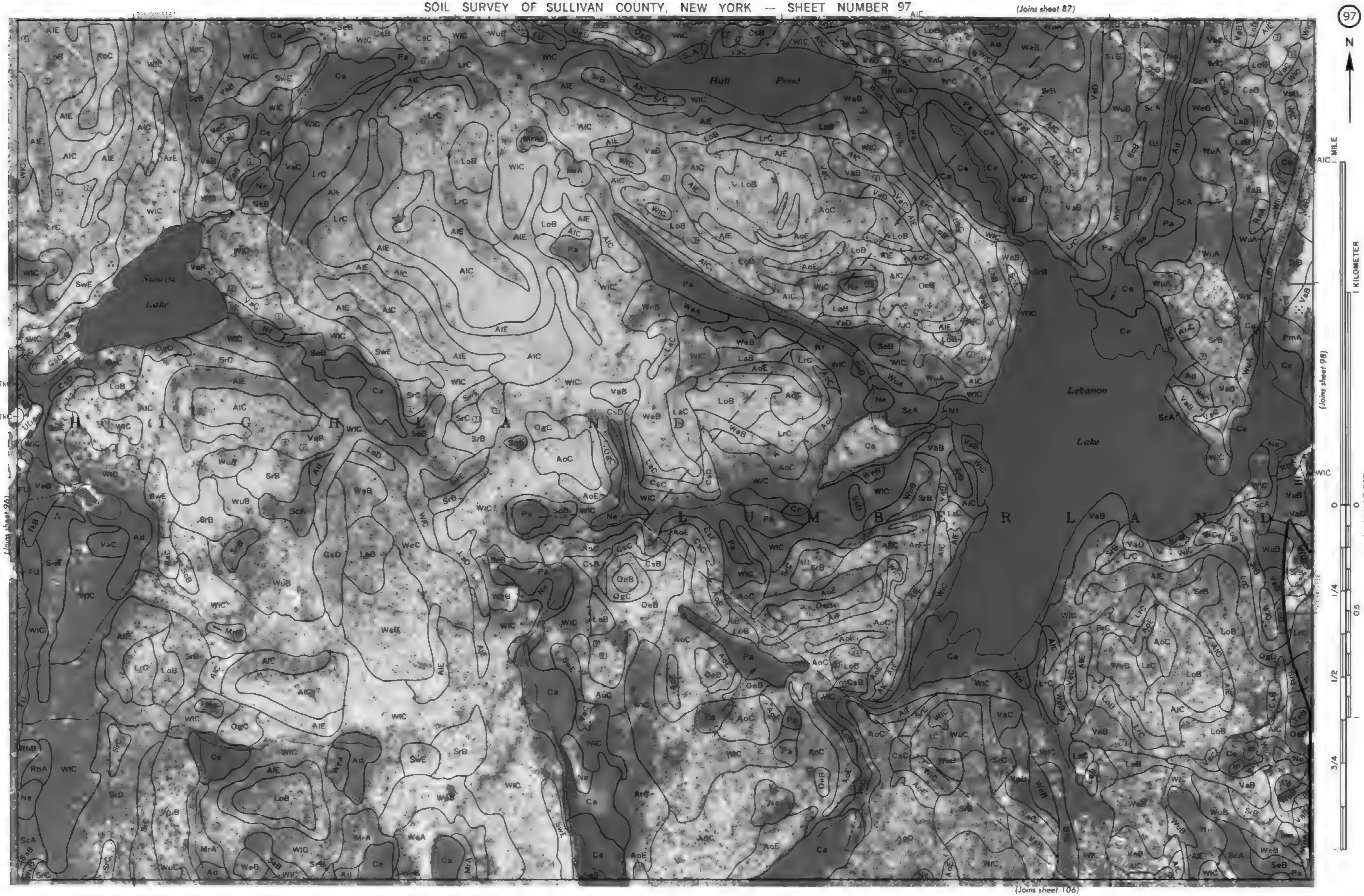

93
N
(Joins sheet 83)
(Joins sheet 92)
(Joins sheet 103)
M A M A K A T I N G
Echo Lake
Brickman Lake
Lake Jerry
Roosa Gap
Burlingham
Platte Kill
ULSTER COUNTY
ORANGE COUNTY
Shawangunk Kill
1 MILE
1 KILOMETER
Scale 1:15,840
0
1/4
1/2
3/4
1
0.5


(Joins sheet 84)
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins lower right)
(Joins sheet 104)
(Joins sheet 95)
(Joins inset, left)
310 000 FEET
DELAWARE
RIVER
PIKE COUNTY, PENNSYLVANIA
T U S T E N
Tusten Station
Tusten
Tenmile River

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 95



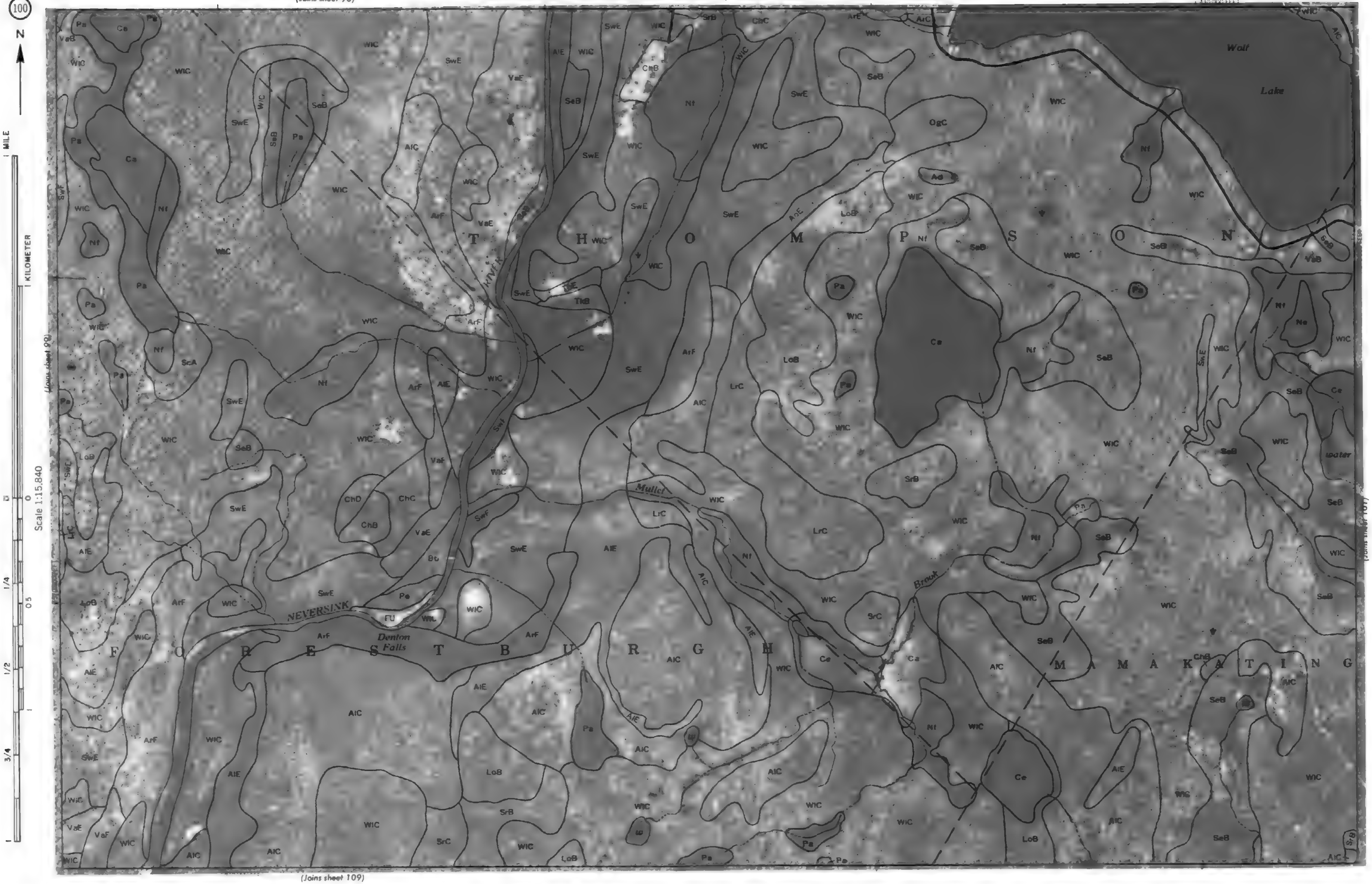

96
N
1 MILE
1 KILOMETER
Scale 1:15,840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 86)
(Joins sheet 95)
(Joins sheet 97)
(Joins sheet 105)
Wellmet Lake
Balsam Pond
Turnpike Pond
Silver Lake
Beaver Brook Corner
Blind Pond
Sidwell Lake
MEADOWBROOK LANDING STRIP
T U S T E N
H I G H L A N D
12
22

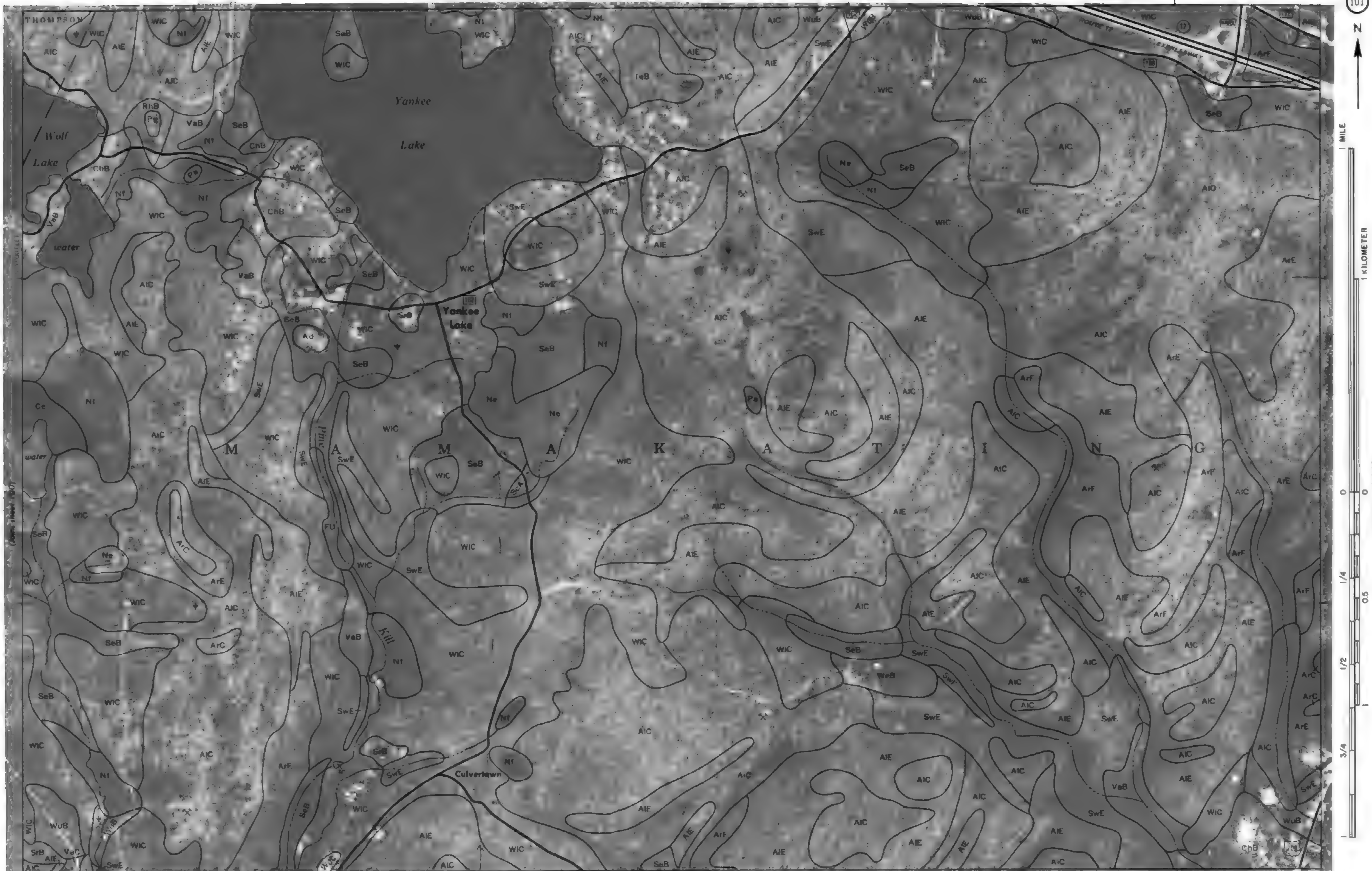

(Joins sheet 87)
97
N
Hull Pond
Sunrise Lake
Lebanon Lake
H I G H L A N D
L U M B E R L A N D
(Joins sheet 98)
(Joins sheet 96)
(Joins sheet 106)
MILE
KILOMETER
Scale 1:15 840


(Joins sheet 88)
(Joins sheet 97)
(Joins sheet 99)
(Joins sheet 107)
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0.5
SWINGING BRIDGE RESERVOIR
Ruddick Pond
McAuleys Lake
Schillings Lake
Forest Glen Lake
Mongaup Falls Res
MONGAUP RIVER
Cliff Lake
Black Brook
F O R E T B U R G H


Saint Josephs Lake
(Joins sheet 89)
99
N
Trout Lake
Gillman Pond
Philwold
Merriewold Park
Merriewold Lake
Spring Brook
Eden Brook
Black Brook
Kill
P O R T E S T B U R G H
(Joins sheet 98)
(Joins sheet 100)
(Joins sheet 108)
MILE
KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0.5

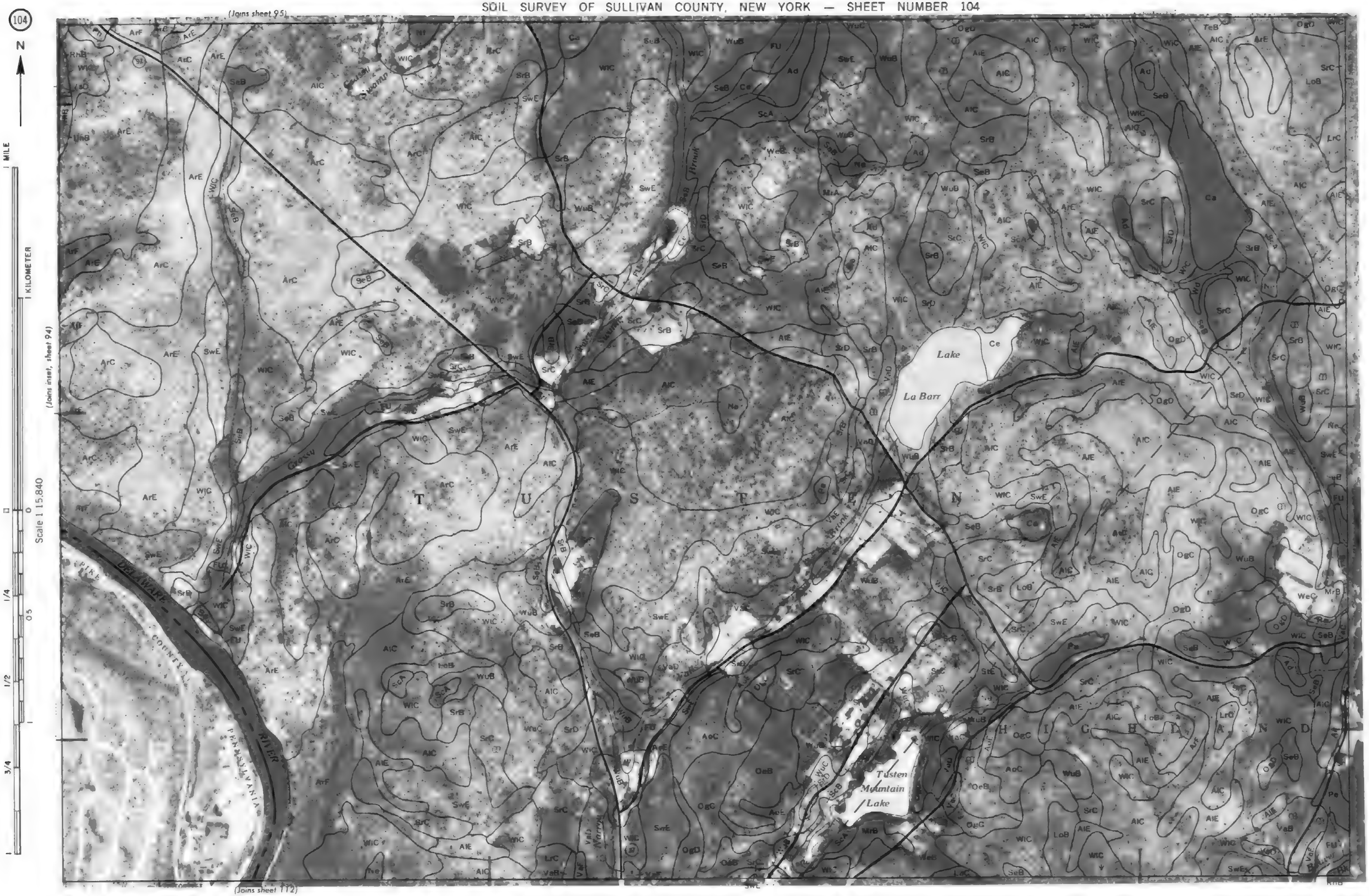
SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 100

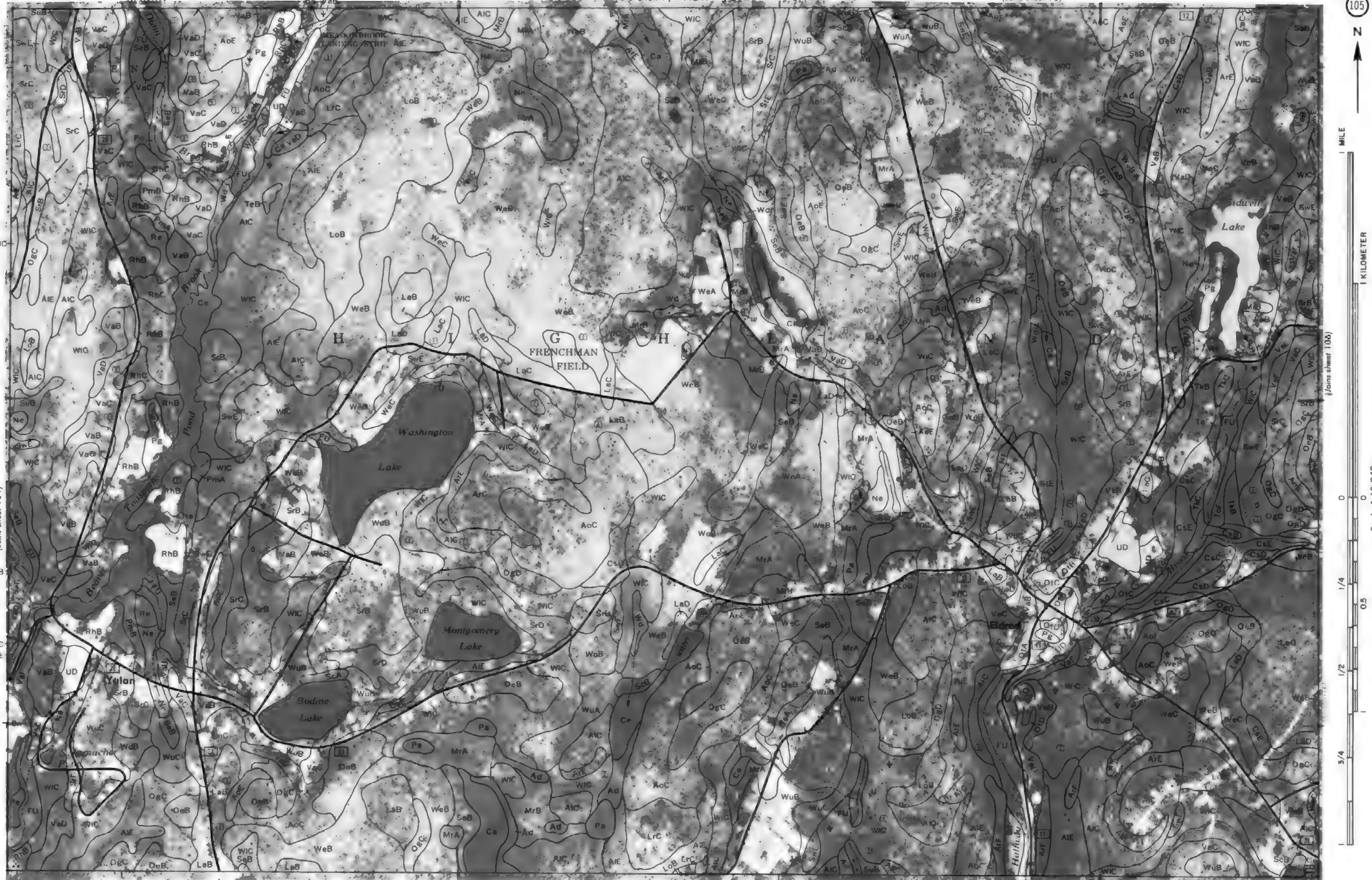


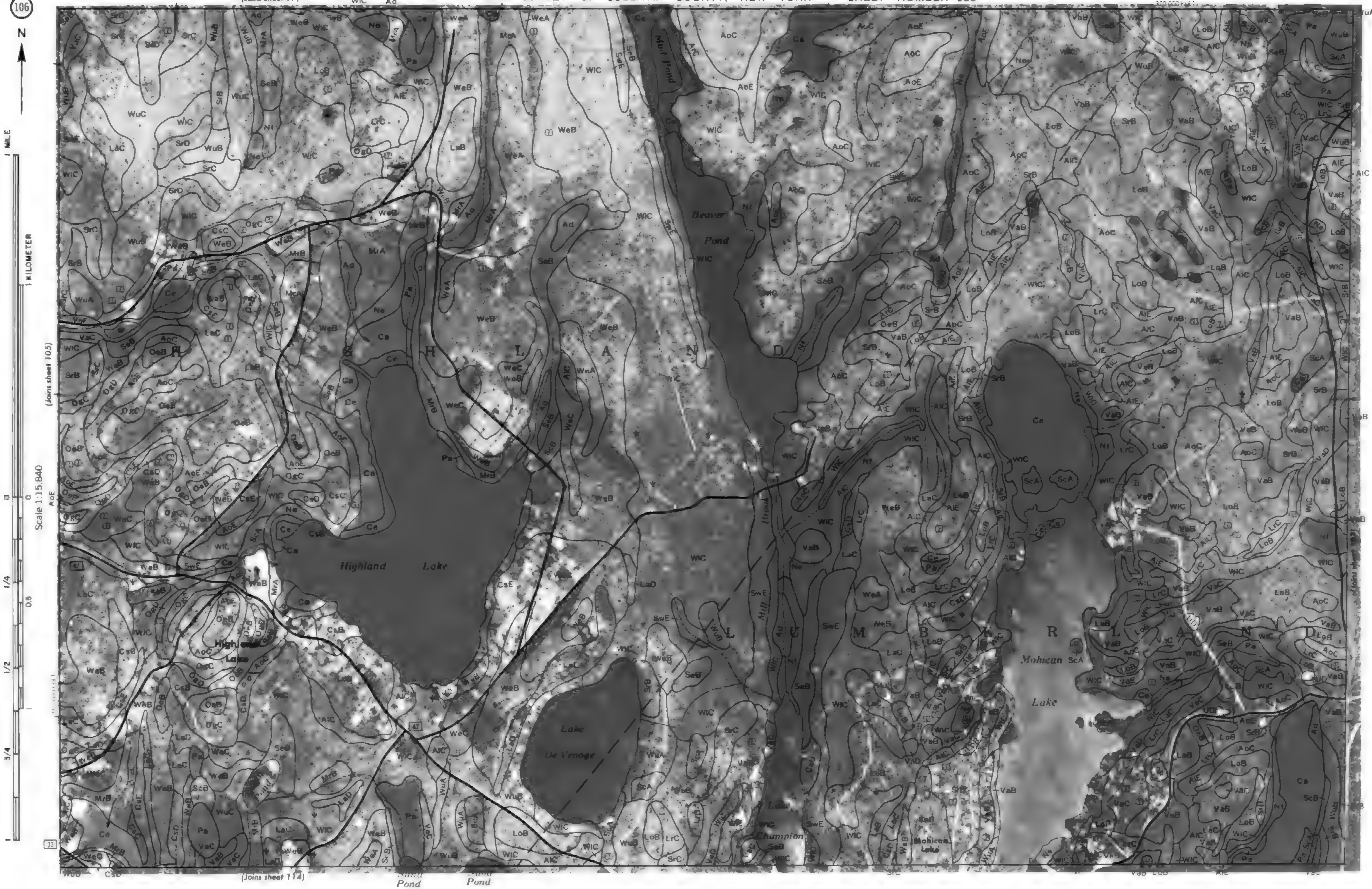

THOMPSON
Wolf
Lake
Yankee
Lake
Yankee
Lake
water
MAMAKATING
Kill
Culvertown
EXPRESSWAY
N
MILE
KILOMETER
Scale 1:15,840
0
1/4
1/2
3/4
1
0
0.5
1


102
(Joins sheet 92)
(Joins sheet 101)
(Joins sheet 103)
(Joins sheet 111)
N
1 MILE
1 KILOMETER
Scale 1:15,840
0
1/4
1/2
3/4
0.5
Wurtsboro
Brook
Kill
Basher
water
ROUTE 17 EXPRESSWAY
High View
Bloomingburg
SHAWANGUNK
MOUNTAINS
M
M
A
K
A
T
I
N
G

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 103


104
N
1 MILE
1 KILOMETER
Scale 1:15 840
(Joins sheet 95)
(Joins inset, sheet 94)
(Joins sheet 112)
Lake
La Barr
Tusten
Mountain
Lake
T U S T E N
H I G H L A N D
DELAWARE RIVER
PIKE COUNTY
PENNSYLVANIA


(Joins sheet 96)
(Joins sheet 104)
(Joins sheet 106)
(Joins sheet 113)
MEADOWBROOK LANDING STRIP
FRENCHMAN FIELD
H I G H L A N D
Washington Lake
Montgomery Lake
Bodine Lake
Lake
Eldred
Yulan
Pond Brook
Beaver Brook
Halfway Brook
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5


(Joins sheet 97)
(Joins sheet 105)
(Joins sheet 114)
N
1 MILE
1 KILOMETER
Scale 1:15 840
H I G H L A N D
L U M B E R L A N D
Highland Lake
Beaver Pond
Mud Pond
Mill Brook
Lake De Venoge
Mohican Lake
Champion Lake
Sand Pond
Highland Lake

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 107

(Joins sheet 99)

N

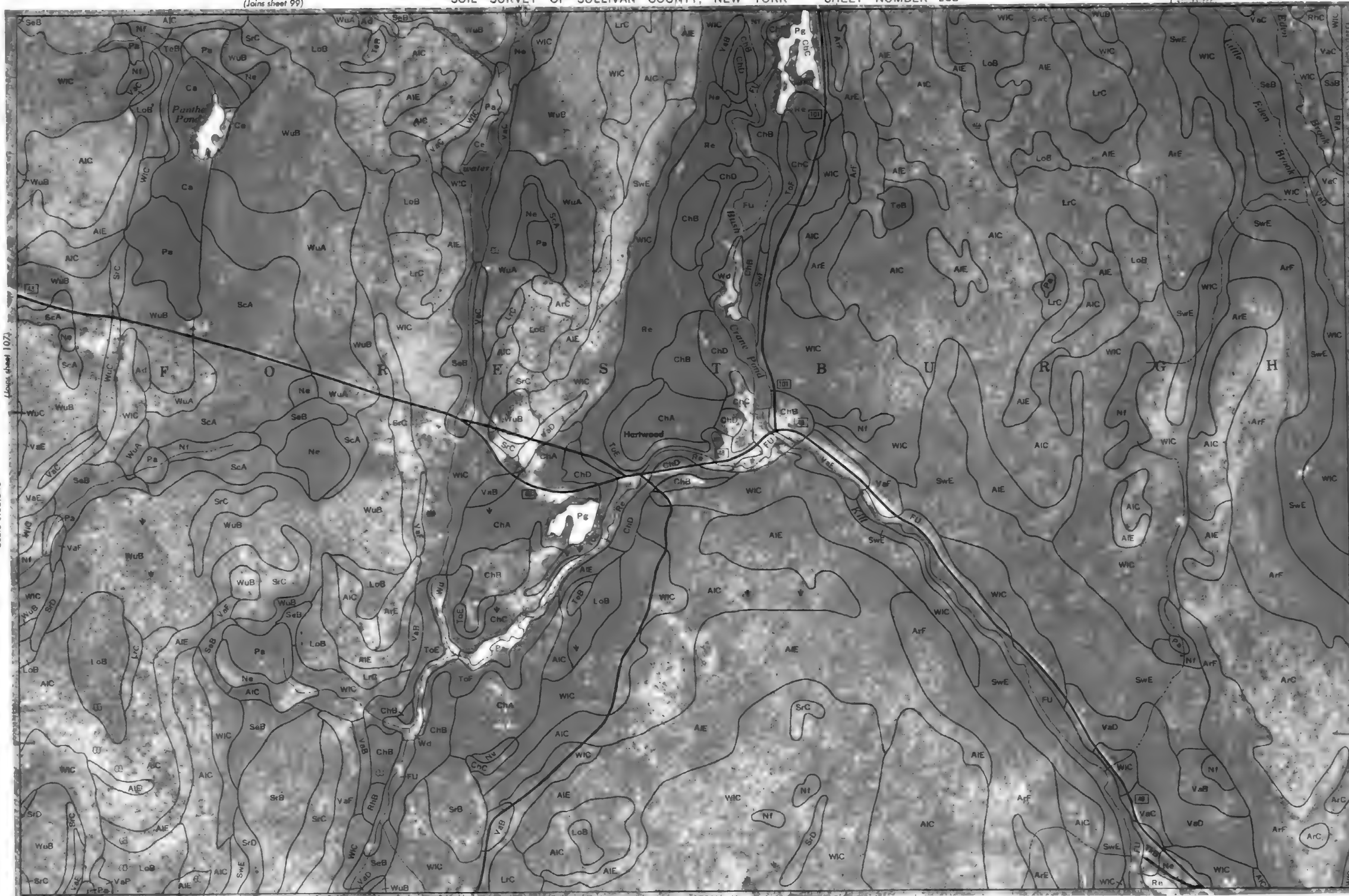
1 MILE

1 KILOMETER

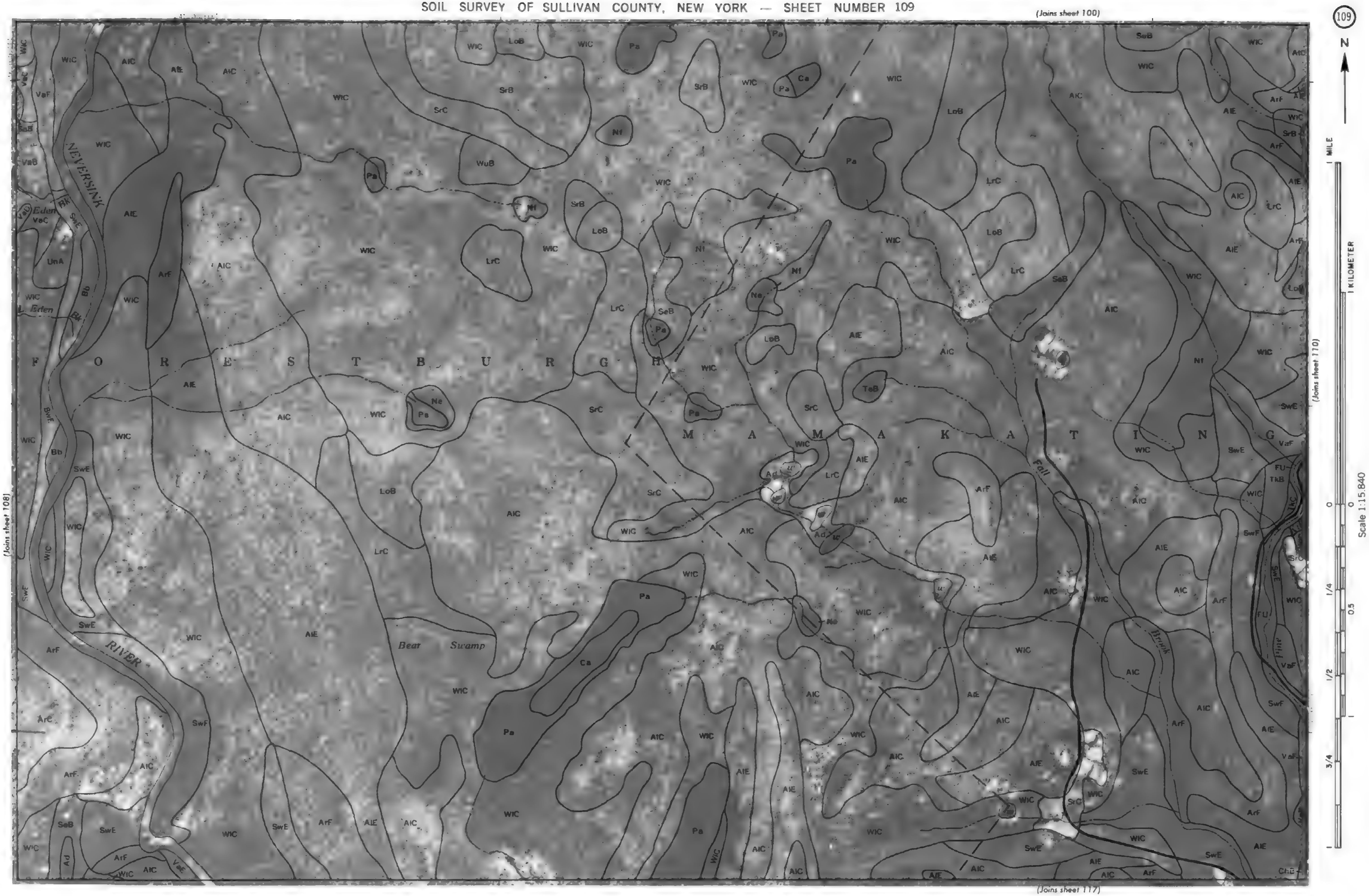
Scale 1:15 840

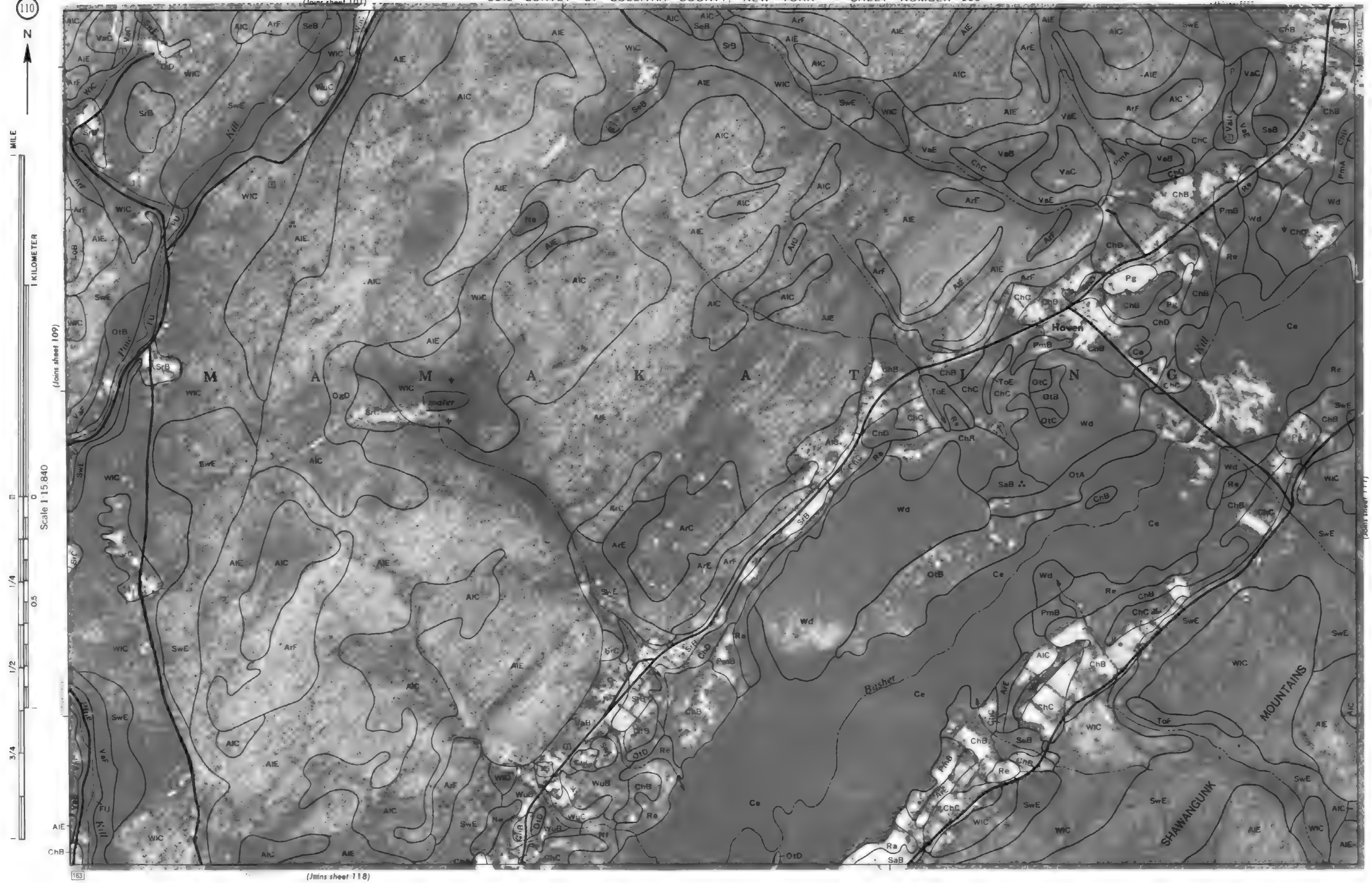
0 1/4 1/2 3/4 1

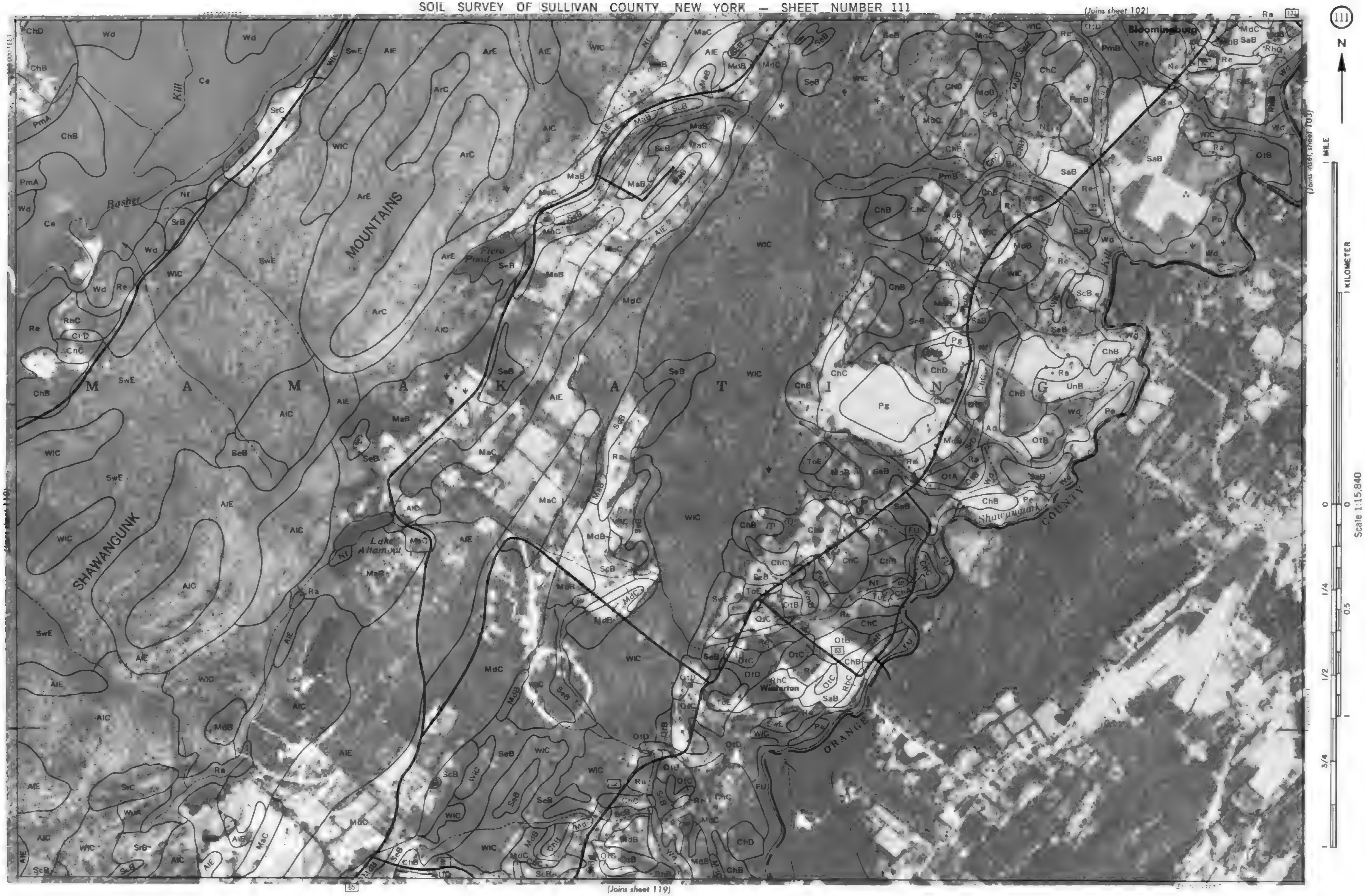
0 0.5 1



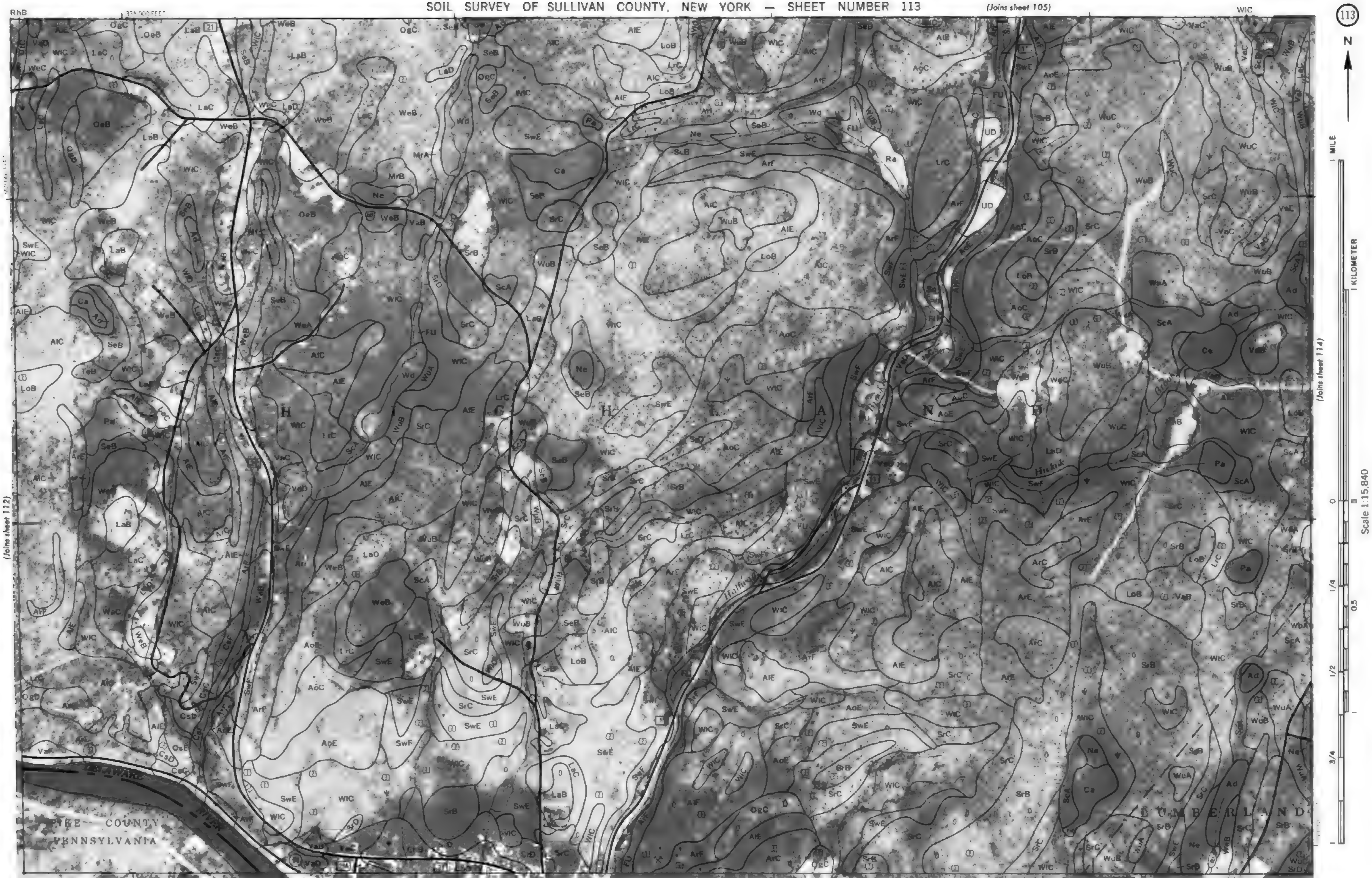
(Joins sheet 116)

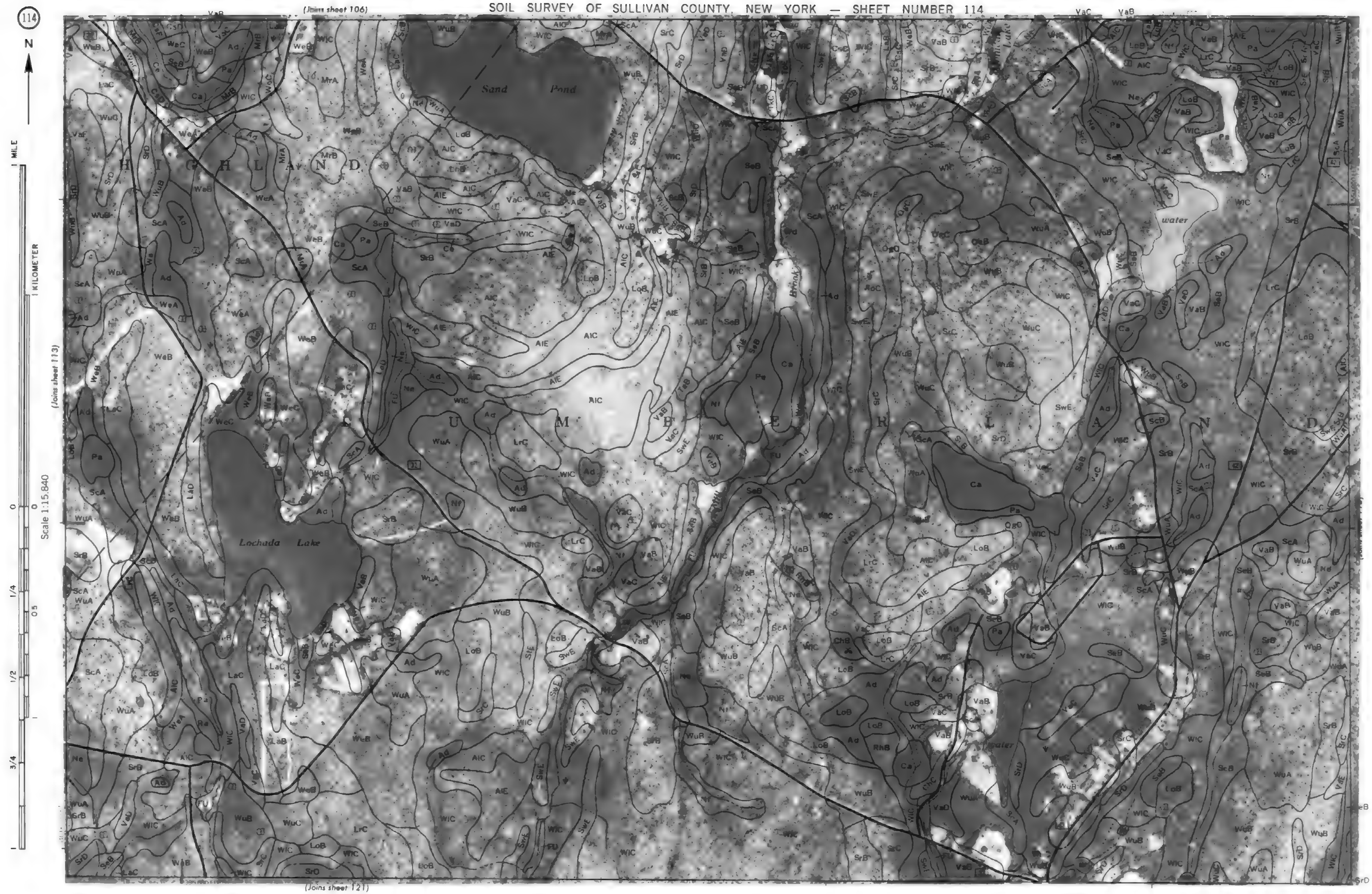

(Joins sheet 100)
(Joins sheet 108)
(Joins sheet 110)
(Joins sheet 117)
109
N
F O R E S T B U R G H
M A M A K A T I N G
NEVERSINK
RIVER
Bear Swamp
Fall
Brook
Eden
Erfen
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5


110
N
MILE
KILOMETER
Scale 1:15 840
(Joins sheet 101)
(Joins sheet 109)
(Joins sheet 118)
M A M A K A T I N G
Haven
Kill
Basher
SHAWANGUNK
MOUNTAINS

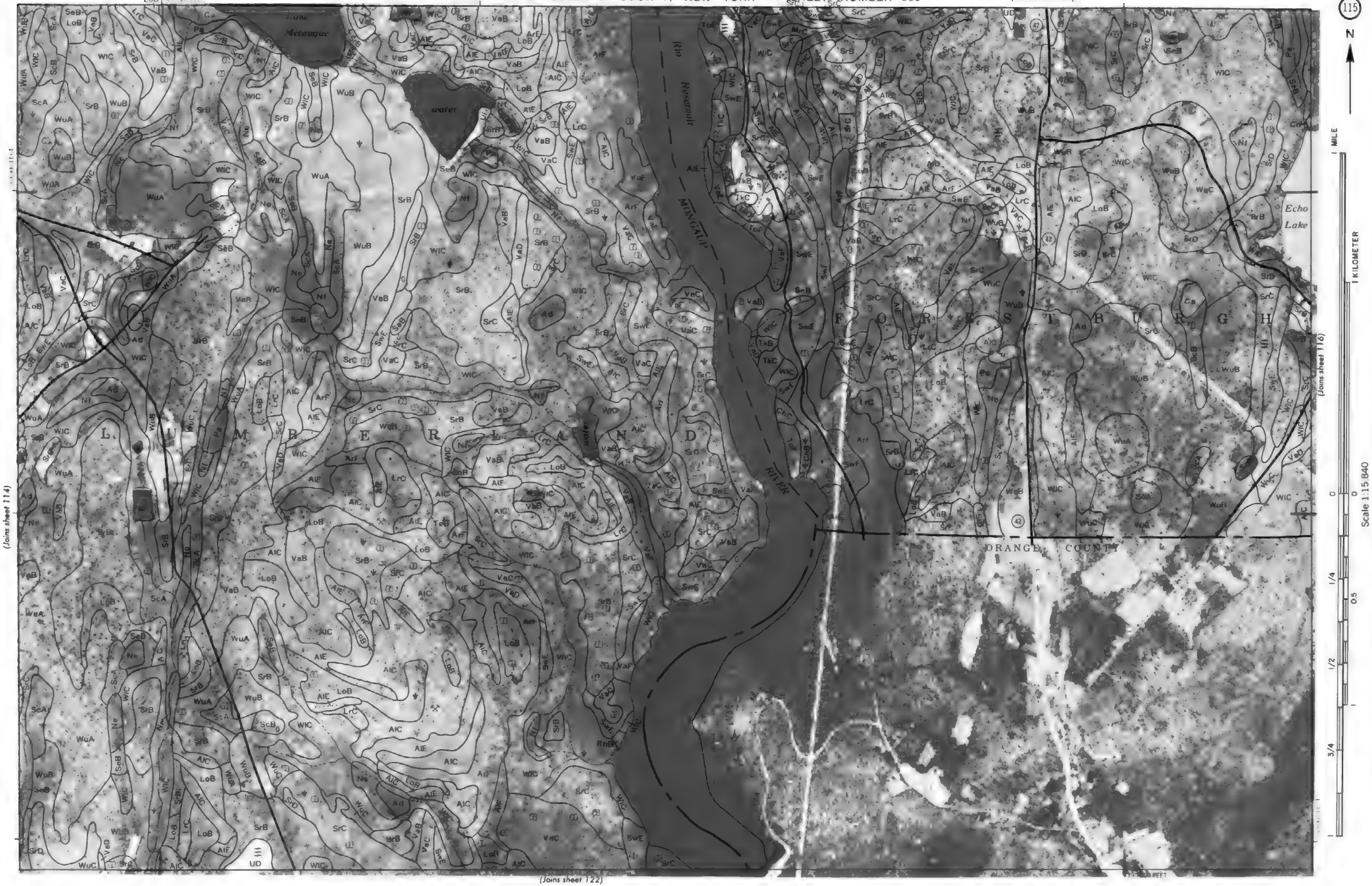

(Joins sheet 102)
111
N
(Joins sheet 119)
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
SHAWANGUNK
MOUNTAINS
M A M A K A T I N G
Bloomingburg
Wurtsboro
Lake Altamont
Fiero Pond
Basher Kill
ORANGE COUNTY
Shawangunk
Kill

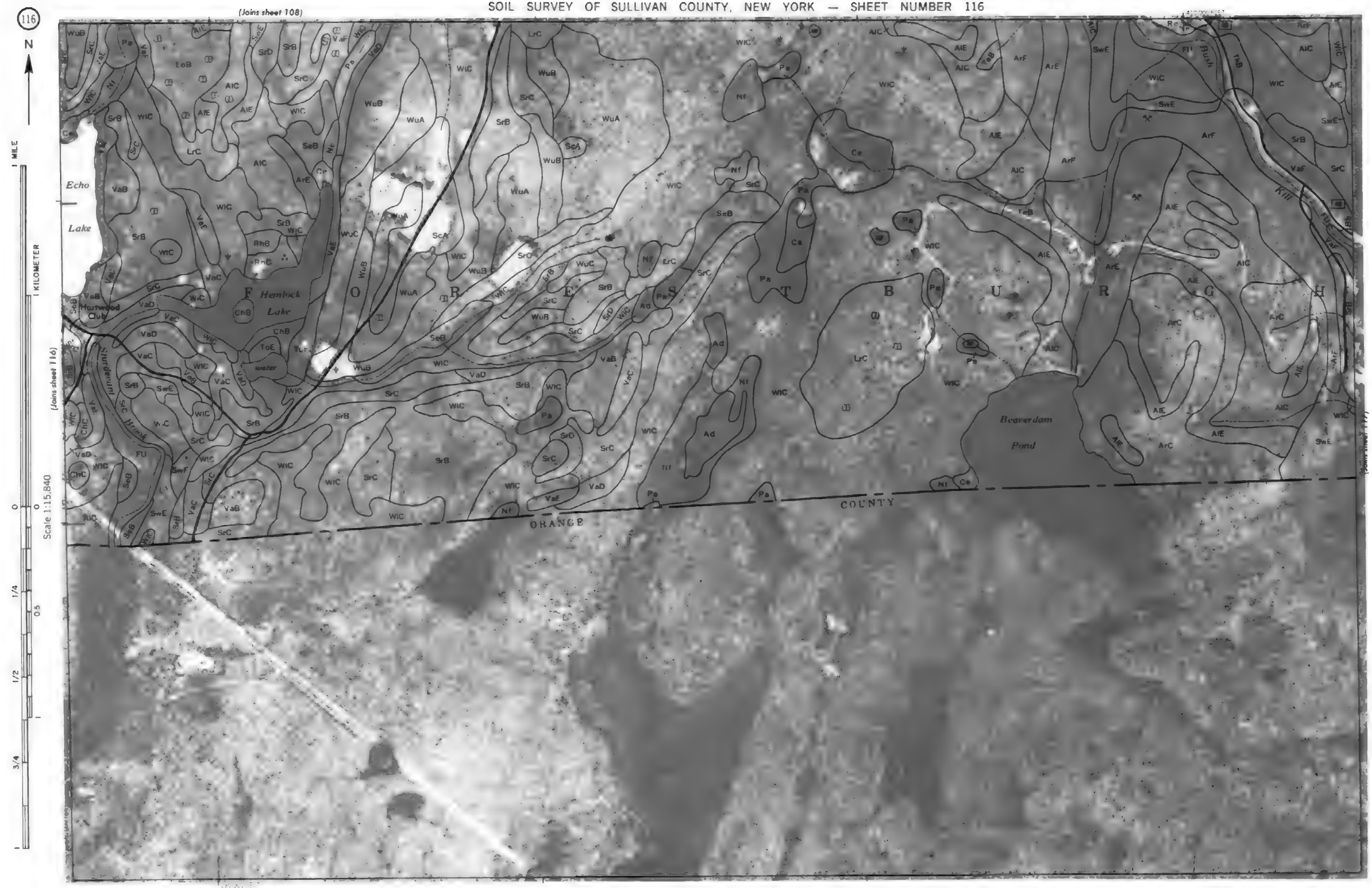

(Joins sheet 104)
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
0.5
T U S T E N
PIKE COUNTY
PENNSYLVANIA
DELAWARE RIVER
York Lake
Wolf Pond
H I G H L A N D
MINISINK BATTLEFIELD MEMORIAL
Minisink Pond
Mongaup River
PIKE COUNTY
PENNSYLVANIA
(Joins sheet 113)
(Joins inset, sheet 120)


(Joins sheet 105)
(Joins sheet 114)
(Joins sheet 120)
(Joins sheet 112)
113
N
1 MILE
1 KILOMETER
Scale 1:15,840
0
1/4
1/2
3/4
0.5
COUNTY
PENNSYLVANIA
RIVER
Hickok
Halfway

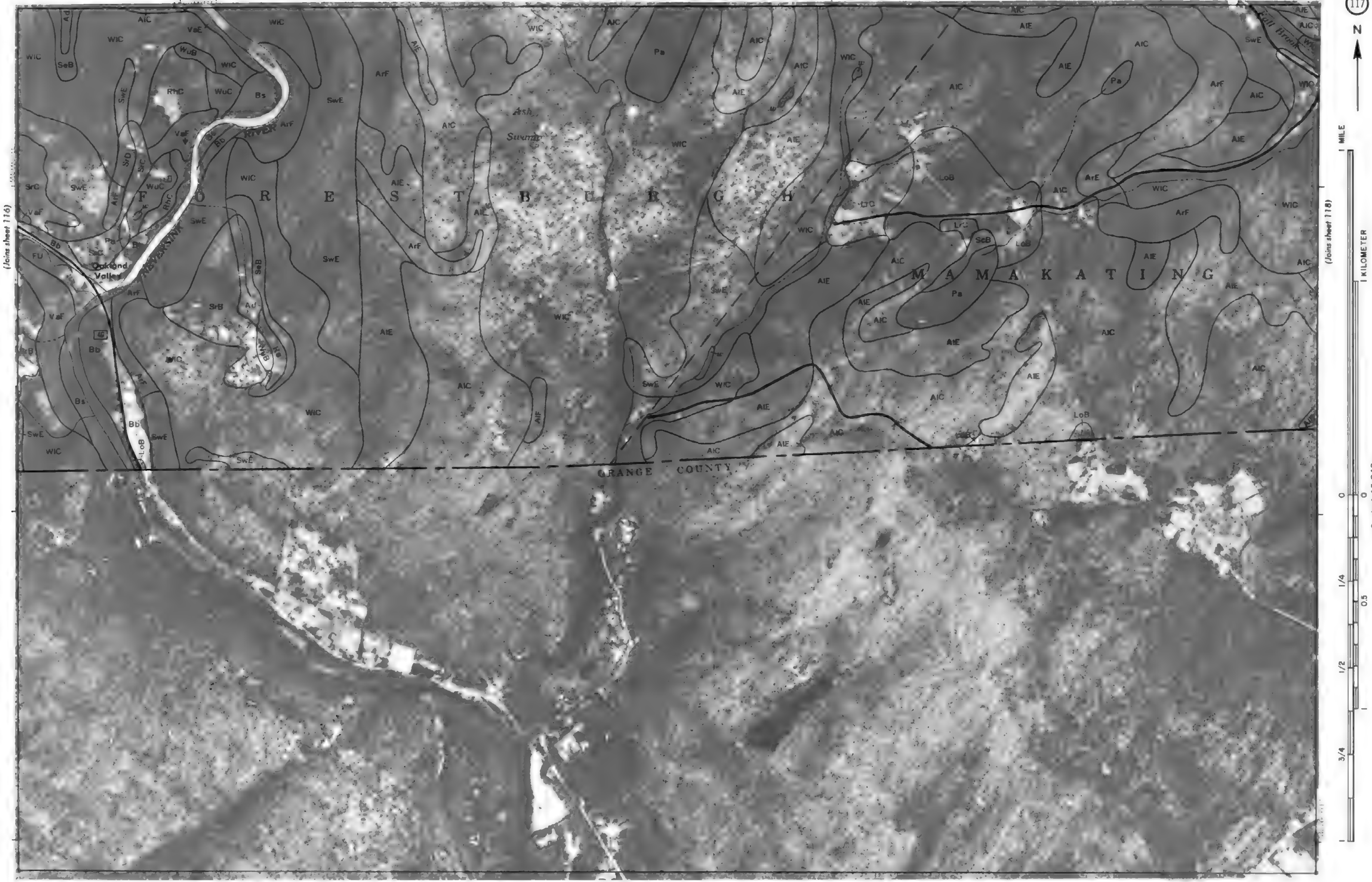

114
(Joins sheet 106)
(Joins sheet 113)
(Joins sheet 121)
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
1/2
3/4
1
0
0.5
Sand Pond
Lochada Lake
water
HIGHLAND
UMBERLAND

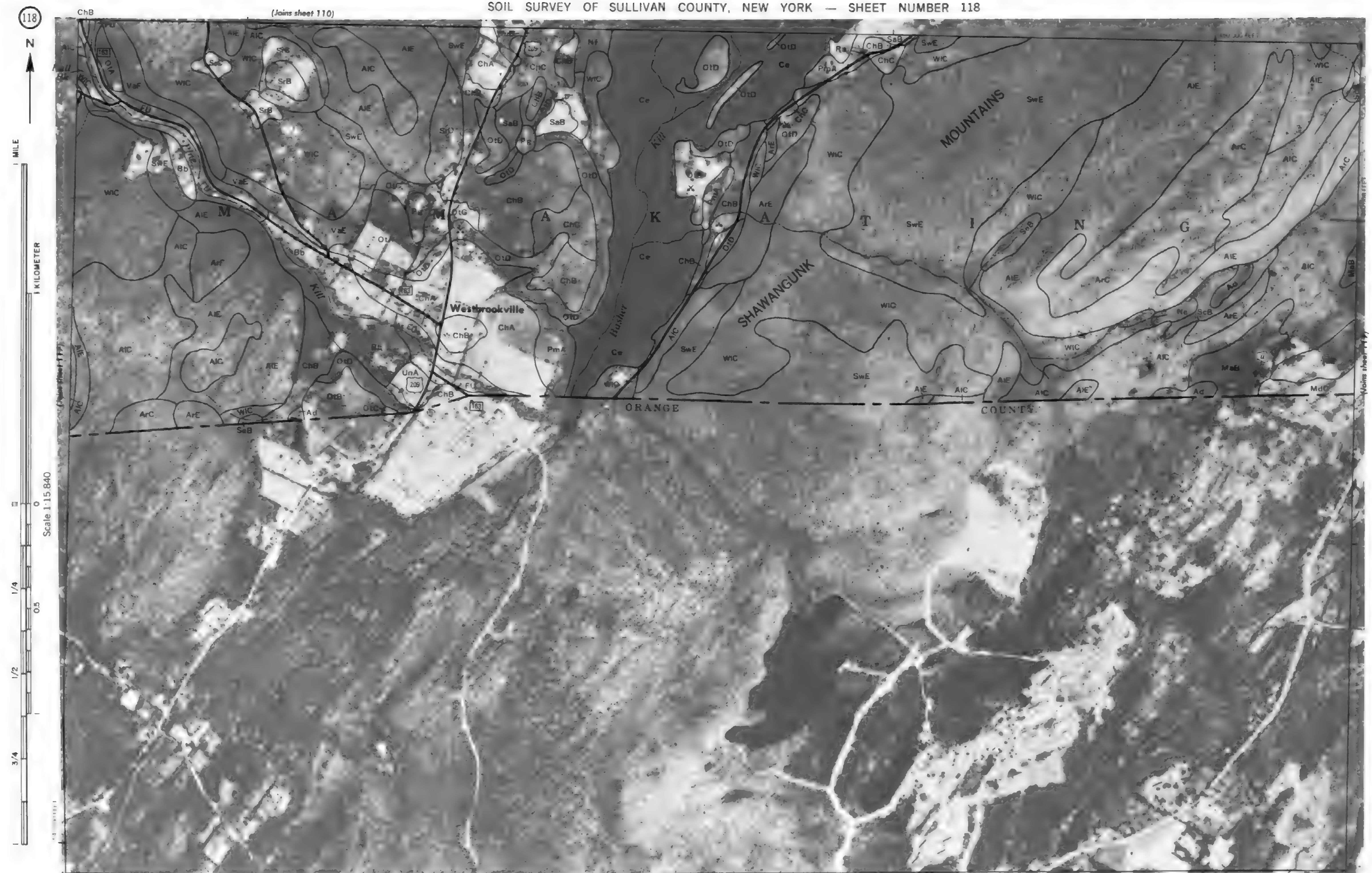
SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 115



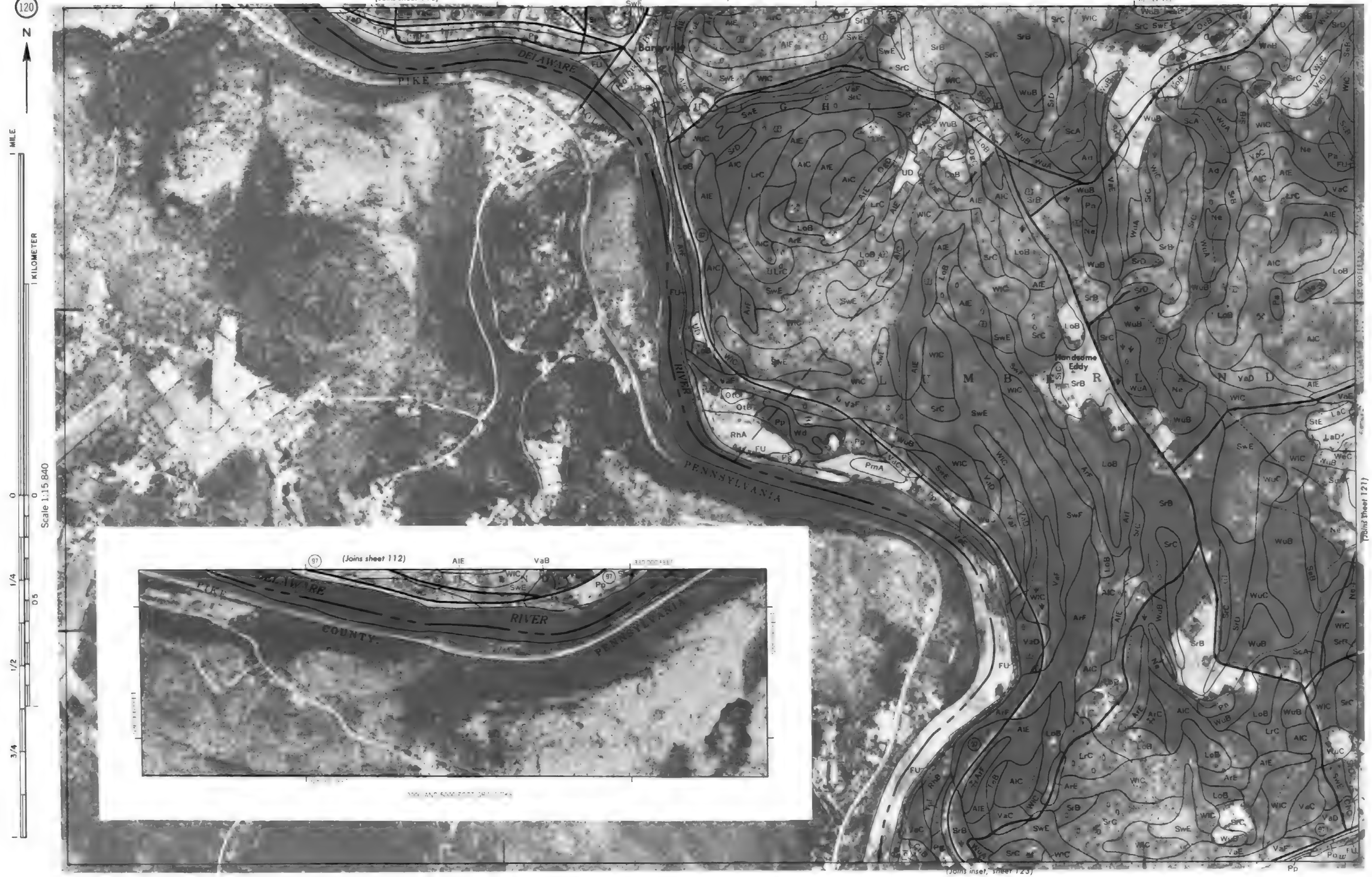

116
N
(Joins sheet 108)
(Joins sheet 116)
(Joins sheet 117)
1 MILE
1 KILOMETER
Scale 1:15,840
0
1/4
1/2
3/4
0.5
Echo
Lake
Hemlock
Lake
Hartwood
Club
water
Sturdevant
Brook
Beaverdam
Pond
Bush
Kill
F O R E S T   B U R G H
ORANGE
COUNTY

(Joins sheet 109)

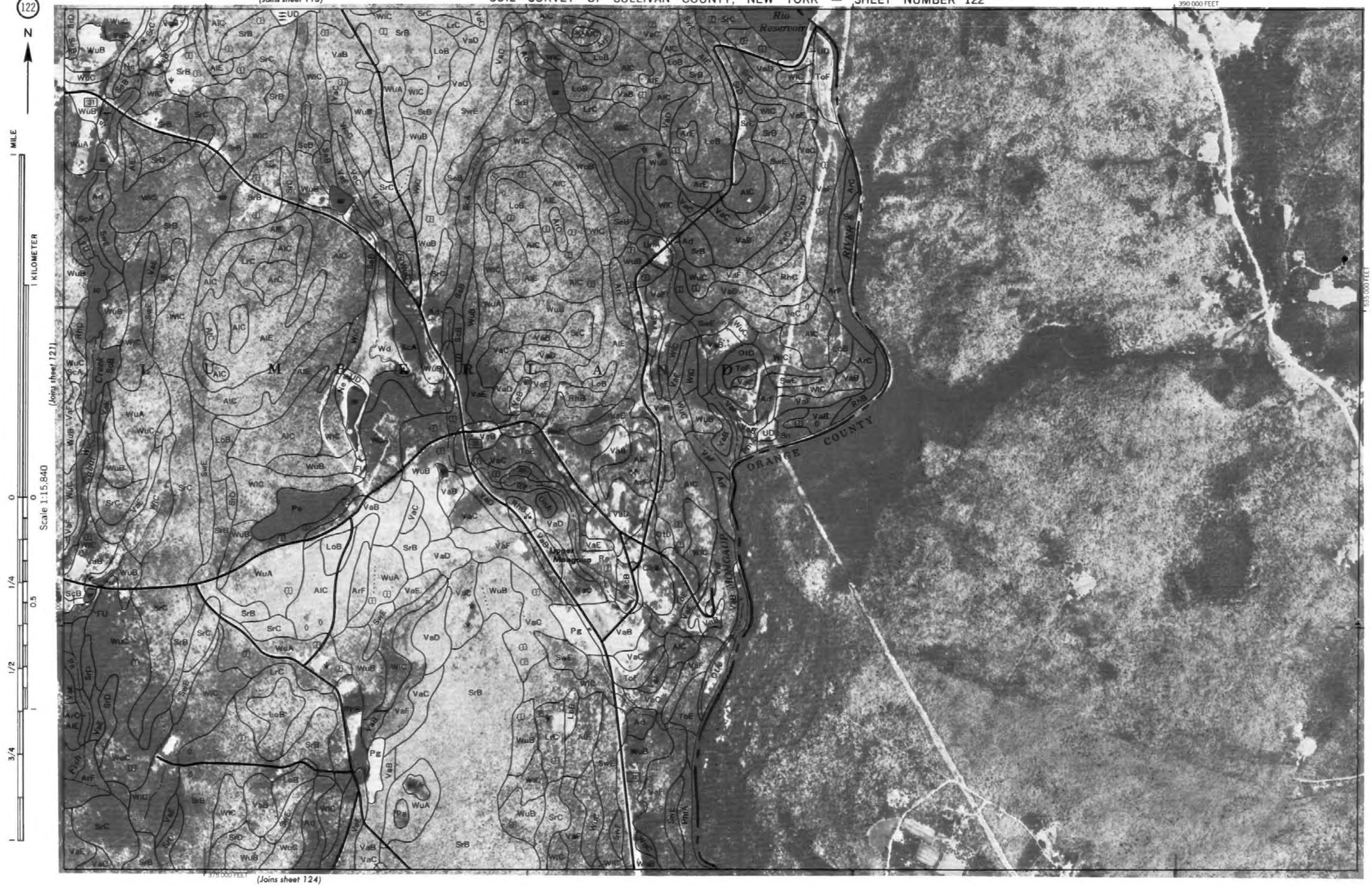


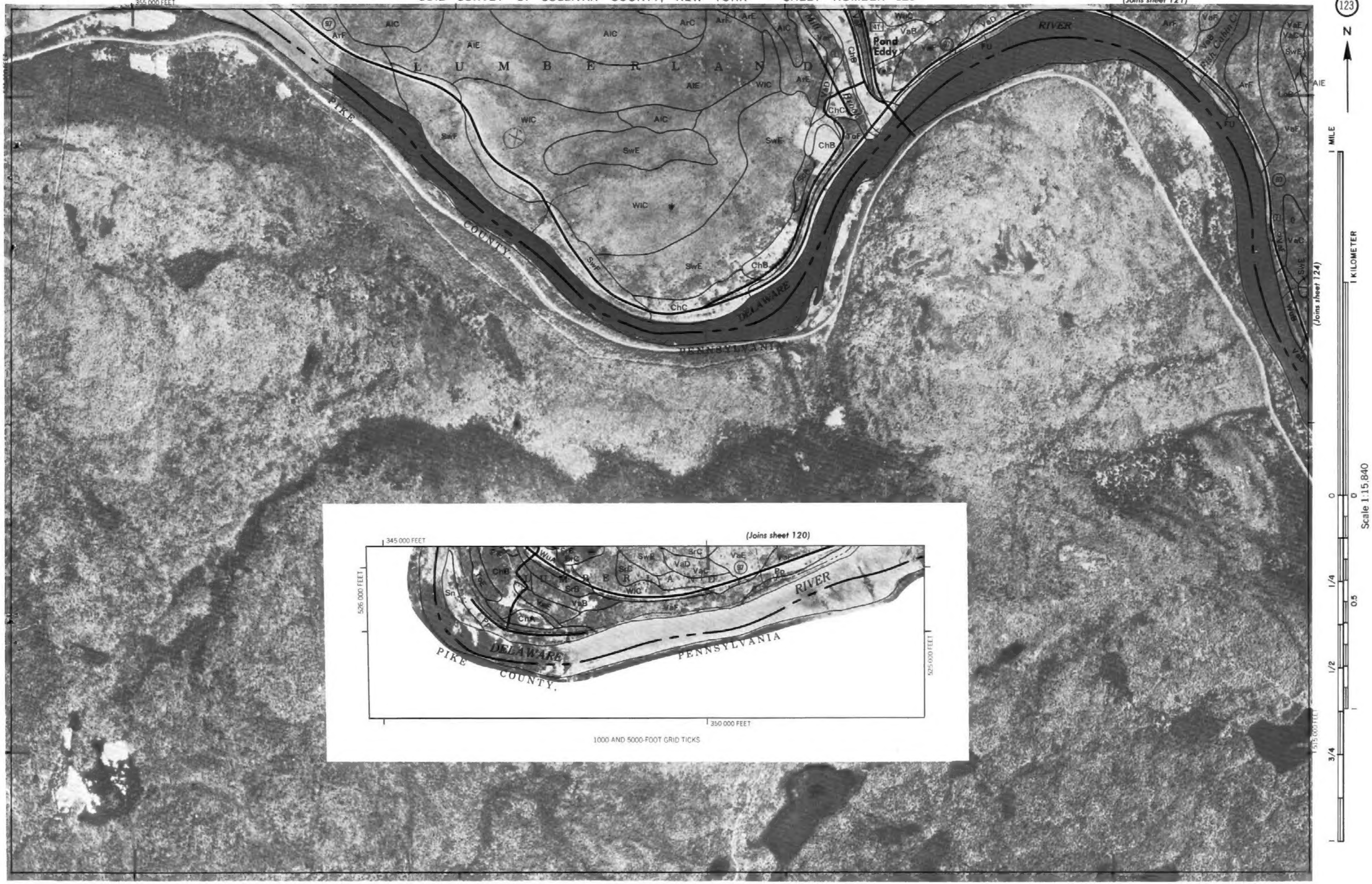

118
N
(Joins sheet 110)
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
0.5
1/2
3/4
Westbrookville
SHAWANGUNK
MOUNTAINS
M A M A K A T I N G
Basher Kill
ORANGE
COUNTY
ChB
ChA
AlE
AlC
WlC
SwE
OtD
Ce
ArC
ArE
SaB
SrB
PmA
UnA
209
Ad
MdB
ScB


(Joins sheet 111)
(Joins sheet 118)
M A M A K I N G
Shawangunk
Kill
ORANGE
COUNTY
ORANGE
COUNTY
N
MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
Scale 1:15,840


(Joins sheet 113)
Barryville
DELAWARE
PIKE
RIVER
PENNSYLVANIA
S U L L I V A N
C O U N T Y
Handsome Eddy
(Joins sheet 121)
(Joins inset, sheet 123)
(Joins sheet 112)
N
1 MILE
1 KILOMETER
Scale 1:15 840
0
1/4
0.5
1/2
3/4
1


(Joins sheet 114)
(Joins sheet 120)
(Joins sheet 122)
(Joins sheet 123)
121
N
355 000 FEET
535 000 FEET
530 000 FEET
Glen Spey
L U M B E R L A N D
TINK HILL
DELAWARE RIVER
PIKE CO., PA
Brook
Cabin
Fish
water
97
41
MILE
1 KILOMETER
Scale 1:15,840
0
1/4
1/2
3/4
1
0
0.5
Ad
AlC
AlE
ArC
ArE
ArF
ChA
ChB
FU
LaB
LaC
LaD
LoB
LrC
MrB
Ne
Nf
Pa
PmA
PmB
Po
RhB
ScA
ScB
SeB
SrB
SrC
SrD
SwE
UD
VaB
VaC
VaD
VaE
VaF
WeB
WeC
WlC
WuA
WuB
WuC


122
(Joins sheet 115)
(Joins sheet 121)
(Joins sheet 124)
N
1 MILE
1 KILOMETER
Scale 1:15,840
0
1/4
1/2
3/4
1
0.5
390 000 FEET
375 000 FEET
535 000 FEET
Rio Reservoir
RIVER
MONGAUP
ORANGE COUNTY
Upper Mongaup
Creek
L U M B E R L A N D


(Joins sheet 121)
123
N
355 000 FEET
L U M B E R L A N D
Pond Eddy
RIVER
DELAWARE
PIKE COUNTY
PENNSYLVANIA
(Joins sheet 124)
AlC
AlE
ArC
ArF
WlC
SwE
SwF
ChB
ChC
VaB
VaC
VaD
VaE
VaF
Fu
515 000 FEET
(Joins sheet 120)
345 000 FEET
350 000 FEET
526 000 FEET
525 000 FEET
1000 AND 5000-FOOT GRID TICKS
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
0.5
Scale 1:15 840

SOIL SURVEY OF SULLIVAN COUNTY, NEW YORK — SHEET NUMBER 124